Commonwealth of Pennsylvania.

DEPARTMENT OF AGRICULTURE

BULLETIN No. 267

PROCEEDINGS OF THE
Farmers' Annual Normal Institute
AND SPRING MEETING OF THE State Board of Agriculture

COMPILED BY
A. L. MARTIN, Director of Institutes

HELD AT HOTEL CONNEAUT, EXPOSITION PARK, PA.
MAY 25 TO 27, 1915

HARRISBURG, PA.:
WM. STANLEY RAY, STATE PRINTER
1915.

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PREFACE.

Commonwealth of Pennsylvania,
Department of Agriculture,
Harrisburg, Pa., July 15, 1915.

There is perhaps no source of information upon subjects relating to either practical or scientific agriculture that is so easily available as the Farmers' Institute, and whatever adds to the efficiency of these institutes is of paramount importance. The hope of increasing their usefulness to the farmers of the State has led to the establishment of what is known as the Farmers' Normal Institute, in which all institute managers and lecturers of the State come together once a year for consultation and instruction.

In order that the instruction given at these institutes may be available to the greatest possible number, this Department publishes, in bulletin form, their proceedings, and so we send out the following bulletin, No. 267, containing the full proceedings of the Normal Institute held at Exposition Park, Pa., May 25 to 27, 1915, in the hope that it may prove helpful upon the many farms and in the many farmhouses to which it may come.

N. B. CRITCHFIELD,
Secretary of Agriculture.

LETTER OF TRANSMITTAL.

Commonwealth of Pennsylvania,
Department of Agriculture,
Harrisburg, Pa., July 15, 1915.

Hon. N. B. Critchfield, Secretary of Agriculture:

Dear Sir: I have the honor to present herewith, bulletin of the Twelfth Annual "Farmers Normal Institute," which was held at Exposition Park, Pa., May 25 to 27, 1915.

Very respectfully,

A. L. MARTIN,
Director of Institutes.

MEMBERS

OF THE

Pennsylvania State Board of Agriculture

FOR THE YEAR 1915

MEMBERS EX-OFFICIO

HON. MARTIN G. BRUMBAUGH, Governor.
HON. HENRY HOUCK, Secretary of Internal Affairs.
DR. N. C. SCHAEFFER, Superintendent of Public Instruction.
DR. EDWIN ERLE SPARKS, President of the State College.
HON. A. W. POWELL, Auditor General.
HON. N. B. CRITCHFIELD, Secretary of Agriculture.

APPOINTED BY THE GOVERNOR

John H. Stephens, Esq., Johnstown, Cambria County,....Term expires 1916
Mrs. Jean Kane Foulke, West Chester, Chester County,..Term expires 1917

APPOINTED BY THE PENNSYLVANIA STATE POULTRY SOCIETY

W. Theo. Wittman,....................Allentown,....................1917

APPOINTED BY THE PENNSYLVANIA BEE-KEEPERS' ASSOCIATION

E. A. Weimer,.........................Lebanon, ...1918

ELECTED BY COUNTY AGRICULTURAL SOCIETIES

			Term expires.
Adams,	A. I. Weidner,	Arendtsville,	1918
Allegheny,	C. L. Hood,	Coraopolis, R. D.,	1918
Armstrong,	S. S. Blyholder,	Kelly Station,	1917
Beaver,	Walter C. Dunlap,	West Bridgewater,	1917
Bedford,	Wm. F. Biddle,	Everett,	1918
Berks,	H. G. McGowan,	Geiger's Mills,	1916
Blair,	W. Frank Beck,	Altoona,	1917
Bradford,	F. D. Kerrick,	Towanda,	1916
Bucks,	B. Frank Wambold,	Sellersville,	1917
Butler,	Wm. H. Milliron,	Euclid,	1917
Cambria,	L. J. Bearer,	Hastings,	1916
Cameron,	R. P. Heilman,	Emporium,	1916

			Term expires.
Carbon,	Edward Lienhard,	Mauch Chunk,	1917
Centre,	John A. Woodward,	Howard,	1918
Chester,	M. E. Conard,	Westgrove,	1918
Clarion,	J. H. Wilson,	Clarion,	1916
Clearfield,	Harrison Straw,	Clearfield,	1916
Clinton,	Joel A. Herr,	Millhall,	1917
Columbia,	A. P. Young,	Millville,	1916
Crawford,	W. F. Throop,	Espyville,	1918
Cumberland,	Abram Bosler,	Carlisle,	1916
Dauphin,	E. S. Keiper,	Middletown,	1917
Delaware,	Thos. H. Wittkorn,	Media,	1917
Elk,	John M. Wittman,	St. Marys,	1916
Erie,	John J. Rouse,	Wattsburg,	1916
Fayette,	John T. Smith,	Dunbar,	1916
Forest,			
Franklin,	J. P. Young,	Marion,	1917
Fulton,	Frank Ranck,	Hancock, Md.,	1916
Greene,	C. E. Lantz,	Carmichaels,	1916
Huntingdon,	George G. Hutchison,	Warrior's Mark,	1918
Indiana,	S. C. George,	West Lebanon,	1916
Jefferson,	Peter B. Cowan,	Brookville,	1916
Juniata,	Matthew Rodgers,	Mexico,	1918
Lackawanna,	Horace Seamans,	Factoryville,	1916
Lancaster,	J. Aldus Herr,	Lancaster,	1917
Lawrence,	Sylvester Shaffer,	New Castle,	1916
Lebanon,	H. C. Snavely,	Cleona,	1916
Lehigh,	P. S. Fenstermacher,	Allentown,	1918
Luzerne,	J. E. Hildebrant,	Dallas,	1918
Lycoming,	A. J. Kahler,	Hughesville,	1918
McKean,	E. A. Studholme,	Smethport,	1916
Mercer,	W. C. Black,	Mercer,	1917
Mifflin,	C. M. Smith,	Lewistown,	1916
Monroe,	F. S. Brong,	Saylorsburg,	1916
Montgomery,	John H. Schultz,	Norristown,	1917
Montour,	J. Miles Derr,	Milton,	1916
Northampton,	C. S. Messinger,	Tatamy,	1918
Northumberland,	I. A. Eschbach,	Milton, R. D.,	1916
Perry,	Clark M. Bower,	Blain,	1916
Philadelphia,	David Rust,	Philadelphia,	1916
Pike,	B. F. Killam,	Paupack,	1918
Potter,			
Schuylkill,	John Shoener,	New Ringgold,	1916
Snyder,			
Somerset,	Robert W. Lohr,	Boswell,	1917
Sullivan,	G. Eugene Bown,	Forksville,	1918
Susquehanna,	Frank A. Davies,	Montrose,	1916
Tioga,	C. H. DeWitt,	Mansfield,	1917
Union,	J. Newton Glover,	Vicksburg,	1917
Venango,	Wm. A. Crawford,	Cooperstown,	1916
Warren,	R. J. Weld,	Sugargrove,	1917
Washington,	Jas. M. Paxton,	Houston,	1917
Wayne,	W. E. Perham,	Varden,	1917
Westmoreland,	W. F. Holtzer,	Greensburg,	1916
Wyoming,	G. A. Benson,	Tunkhannock,	1916
York,	Geo. F. Barnes,	Rossville,	1917

OFFICERS

PRESIDENT

Hon. Martin G. Brumbaugh,	Harrisburg.

VICE-PRESIDENTS

F. D. Kerrick,	Towanda.
J. P. Young,	Marion.
C. H. DeWitt,	Mansfield.

EXECUTIVE COMMITTEE

S. S. Blyholder,	Kelly Station.
P. S. Fenstermacher,	Allentown.
W. C. Black,	Mercer.
A. J. Kahler,	Hughesville.
G. F. Barnes,	Rossville.
Hon. H. G. McGowan,	Geiger's Mills.
C. M. Bower,	Blain.
Matthew Rodgers,	Mexico.
John Shoener,	New Ringgold.
Hon. N. B. Critchfield, Secretary of Agriculture, Ex-Officio,	Harrisburg.

ADVISORY COMMITTEE, CONSULTING SPECIALISTS AND STANDING COMMITTEES AS REPORTED BY THE EXECUTIVE COMMITTEE

ADVISORY COMMITTEE

J. H. Schultz,	Norristown.
Joel A. Herr,	Millhall.
W. C. Black,	Mercer.

LEGISLATIVE COMMITTEE

Hon. H. G. McGowan,	Geiger's Mills.
Hon. Robert W. Lohr,	Boswell.
S. S. Blyholder,	Kelly Station.
P. S. Fenstermacher,	Allentown.
Matthew Rodgers,	Mexico.

COMMITTEE ON RESOLUTIONS

J. Aldus Herr,	Lancaster.
Col. John A. Woodward,	Howard.
B. F. Killam,	Paupack.
George G. Hutchison,	Warrior's Mark.
W. C. Black,	Mercer.

MEMORIAL COMMITTEE.

Matthew Rodgers,	Mexico.
S. S. Blyholder,	Kelly Station.
Joel A. Herr,	Millhall.

CONSULTING SPECIALISTS

Botanist,	Prof. F. D. Kern,	State College.
Pomologist,	Chester J. Tyson,	Floradale.
Chemist,	Dr. William Frear,	State College.
Vet. Surgeon,	Dr. C. J. Marshall,	Harrisburg.
Sanitarian,	Dr. S. G. Dixon,	Harrisburg.
Microscopist and Hygienist,	Prof. J. W. Kellogg,	Harrisburg.
Entomologist,	Prof. H. A. Surface,	Harrisburg.
Ornithologist,	Dr. Joseph Kalbfus,	Harrisburg.
Meteorologist,	Prof. W. G. Owens,	Lewisburg.
Apiarist,	H. C. Klinger,	Liverpool.
Economic Geologist,	Prof. Baird Halberstadt,	Pottsville.
Agricultural Geologist,	W. H. Stout,	Pinegrove.
Forests and Forestry,	Irvin C. Williams,	Harrisburg.
Feeding Stuffs,	G. G. Hutchison,	Warrior's Mark.
Soils and Crops,	Prof. Franklin Menges,	York.

STANDING COMMITTEES

CEREALS AND CEREAL CROPS

Edward Leinhard, ... Mauch Chunk.

ROADS AND ROAD LAWS

Col. J. A. Woodward, ... Howard.

FRUIT AND FRUIT CULTURE

E. A. Studholme, ... Smethport.

DAIRY AND DAIRY PRODUCTS

B. Frank Wambold, ... Sellersville.

FERTILIZERS

F. S. Brong, ... Saylorsburg.

WOOL AND TEXTILE FIBERS

S. C. George, ... West Lebanon.

LIVESTOCK

W. F. Throop, ... Espyville.

POULTRY

W. Theo. Wittman, ... Allentown

PROCEEDINGS OF THE SPRING MEETING OF THE PENNSYLVANIA STATE BOARD OF AGRICULTURE, HELD AT HOTEL CONNEAUT, EXPOSITION PARK, PA., MAY 25, 1915.

Hotel Conneaut, Exposition Park, Pa., May 25, 9:30 A. M.

Vice President Kerrick in the Chair.

The CHAIRMAN: Ladies and Gentlemen: I am delighted to preside at this meeting. It gives me a great deal of pleasure this morning to meet so many of my friends from different parts of the State, and I assure you that it is with pleasure that I greet you. The first order of business is the roll-call.

The Secretary called the roll, and at this and subsequent roll calls, the following members responded to their names:

Hon. N. B. Critchfield (Secretary and Ex-Officio member); W. Theo. Wittman (Appointed by the Pennsylvania Branch of The American Poultry Association); S. S. Blyholder, Wm. F. Biddle, H. G. McGowan, F. D. Kerrick, L. J. Bearer, Edward Lienhard, M. E. Conard, J. H. Wilson, Joel A. Herr, A. P. Young, Abram Bosler, Matthew Rodgers, Horace Seamans, Sylvester Shaffer, J. E. Hildebrant, E. A. Studholme, W. C. Black, F. S. Brong, C. S. Messinger, I. A. Eschbach, John Schoener, C. H. DeWitt, Wm. A. Crawford, R. J. Weld, W. F. Holtzer, G. A. Benson, Geo. F Barnes and J Aldus Herr

The SECRETARY: Mr Chairman, there is a quorum present.

A Member: I am inclined to think that some members are up at the Hall, because there are a number here that are not present at this meeting and I presume they are waiting up there.

The CHAIRMAN: There is a quorum present here. The next order of business is the reading of the minutes.

Secretary Critchfield then read the minutes of the January meeting.

The SECRETARY: It may be a matter of interest to the Board to know that the decision of the Auditor General was against the payment of the expenses of Mr. Marshall. He stated that under the law, it would be impossible to pay his expenses.

The CHAIRMAN: Gentlemen you have heard the minutes as read. If there is no objection, they will be approved.

A Member: I move that they be approved.

The CHAIRMAN: There being no objection, they are approved. The next order of business is the appointment of the Committee on Credentials. I will appoint on that Committee, E. A. Studholme, of McKean, W. A. Crawford, of Venango, and George F. Barnes of York. The Committee will please confer together and make their report.

The SECRETARY: Mr. Studholme, here are the credentials of one member-elect. If there are any other members present having credentials, they can pass them to the committee.

The CHAIRMAN: Next on the program is Reception of Credentials of new members and delegates--I guess there are none. The next order will be Unfinished Business.

The SECRETARY: Mr. Chairman, as you will have observed from the reading of the minutes, there is no unfinished business, except that there is a Committee to report. You notice, no doubt, that one of the Committees, the Committee that was appointed to consider the resolution offered by Mr. Killam in relation to the monies to be received resulting from the passage of what is known as the Smith-Lever Bill, that was referred to the Committee on Legislation; there was also referred to the Committee on Legislation, the recommendations made in certain of the reports of Standing Committees. That would make it necessary for the Committee on Legislation to make a report at this time, or the report can be held over for the annual meeting if it is thought best.

MR. McGOWAN: The Committee on Legislation has not conferred together at this meeting; we are not ready to make a report; we can report later, if desired.

The SECRETARY: This is the only session we will have; unless there is a request for a report at this meeting. Perhaps it might be left as the understanding that you will report at the annual meeting. It will be a matter of interest to the Board, however, to know that you did discharge the duties imposed upon you, you might, in a few words, state what was done.

MR. McGOWAN: Well, the Committee on Legislation assembled at the Bolton House and there was a full representation of the Committee and we went over all matters that were referred to this Committee especially in detail. We took up the Agricultural Commission Bill, and with some amendments, presented that, in a body, before Governor Brumbaugh. We did not feel it advisable to antagonize the measure. We inserted a clause calling for five farmers to have representation upon this Commission, and a few other amendments we made in meeting together with Brother Creasy and Mr. MacFarland and a few others. We went over the Fertilizer Bill and the weight of apples, weight of various farm products, and other matters that were referred to us. We discharged our duties, as we thought, to the best of our ability, and we will make a subsequent report and a full report at the annual meeting.

The CHAIRMAN: Very well, Mr. McGowan.

MR. DEWITT: As Chairman of the Committee, known as the Roads Committee, I will say that they seem to have finished their work and I move you that the Committee be discharged.

Motion seconded and adopted.

The SECRETARY: That was the Committee that was appointed prior to the last annual meeting?

MR. DE WITT: Yes.

The SECRETARY: I would like to add to the motion, that it be discharged with the thanks of the Board, because that Committee had some very strenuous work to perform, and I think we are under an obligation of gratitude to the Committee. Of course, Mr. Killam, being a member of the Committee, will not be expected to accept that amendment, but let it be understood that the Board gives a vote of thanks to the Committee and let the question be on the adoption of Mr. Killam's motion that the Committee be discharged.

Motion adopted.

The SECRETARY: Now, Mr. Chairman, in view of the fact that this Committee has had a good deal of arduous work to perform and did it faithfully and very satisfactorily, I move that a vote of thanks be extended to this Committee.

Motion seconded and adopted.

DR. CONARD: I notice, in the reading of the minutes, that one of the members of the Executive Committee, Mr. Naginey, is not with us, having passed away, and wouldn't it be well to appoint someone in his place at this time?

The CHAIRMAN: I think it is a very proper thing to do.

DR. CONARD: Mr. Naginey was also a member of the Resolutions Committee, I think.

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MR. KILLAM: I move you, Mr. Chairman, that the Chair appoint to fill the vacancy caused by the death of Mr. Naginey, on the Executive Committee and on the Resolutions Committee.

Motion seconded.

The CHAIRMAN: It is moved and seconded that the Chair appoint a member to fill the place of Mr. Naginey on the two Committees.

Motion adopted.

MR. STUDHOLME: The Committee on Credentials is ready to make a report.

The CHAIRMAN: I will appoint in place of Mr. Naginey, Mr. Black, of Mercer county, on the Executive Committee and also on the Resolutions Committee. Now Mr. Studholme, we will hear your report.

Mr. Studholme then submitted the following report of the Committee on Credentials recommending the election of Mr. Smith as a member of the Board from Mifflin county.

MR. JOEL A. HERR: His term will expire then with Mr. Naginey's?

The SECRETARY: It is understood, Mr. Studholme, that your report intended to place this gentleman, Mr. Smith, in place of Mr. Naginey and that his term shall expire when Mr. Naginey's term would have expired?

MR. STUDHOLME: Yes sir.

MR. JOEL A. HERR: Will you tell us when that was? I think that was omitted on the program.

The SECRETARY: I cannot tell you why that omission was made.

A Member: Will you find when his term expires on the program of last winter's meeting?

The SECRETARY: The records are in the office but I haven't the information just now.

MR. JOEL A. HERR: I would just like to make a little statement here: I have taken the pains to go over the list of members and the date of the expiration of their term of office and I find that those whose terms expire in 1916 are about 50% greater than those that expire in 1918—something near that. Now, in order to equalize that, I think that some action should be taken by the Credentials Committee, or some proper authority, to have the thing equalized, as the law creating the Board states that one-third of the number of terms must expire each year. That lets a great deal more than one-third come in in 1916 than in 1918. 1917 is between the two, and it is also between in the number of expirations, but it is nearer right than either of the others.

MR. BARNES: I think there is a chance to figure that out this year. A few years ago a number of counties had failed for several years to elect a member of the State Board and I think it was requested at one of these meetings that the Secretary urge the election of a member, which resulted in more counties electing members that year, which would bring about this surplus membership. I think the Secretary will remember what took place at that time.

The SECRETARY: Mr. Herr has usually been on the Credentials Committee and probably will be on that Committee at the next annual meeting and that will give him a chance to carry out his suggestion. I think the change occurred just in the way Mr. Barnes has expressed it, but I could not say positively.

MR. JOEL A. HERR: If the Committee has the authority to fix the terms, suppose that someone—we will say Potter county which is not represented on the Board now, should send in a man for three years from the date of his election, that might happen just to occur in the year 1916 or 1918, and I do not know whether the Committee would have power to correct that, but if there should be an understanding from headquarters I think these organizations would come in with that understanding as to when their terms should expire.

The SECRETARY: You can count the regular terms from the time when they had the last member of the Board.

MR. JOEL A. HERR: The dates were all right once but the membership has increased and the dates have been changed since its organization.

MR. KILLAM: It seems to me that that matter can be only corrected by the Legislature. When a man is elected by an agricultural organization, it states that his term exists for three years from his election, whatever the date may be. Do I understand, Mr. Herr, that the Committee could fix the term? The intention of this Committee was to confirm the appointment for the unexpired term of Mr. Naginey, whatever it might be and the law fixes the term of service as I understand it, for the term of three years. A man's term expires three years after he has qualified.

MR. JOEL A. HERR: The law also says that the Board shall be divided into three parts; that one-third of the members shall go out each year; there is a contradiction there.

The SECRETARY: Well those things do sometimes occur and it is pretty hard to get over; when they go out and stay out, that makes trouble.

MR. JOEL A. HERR: I think it can be done through the Secretary.

MR. MATTHEW RODGERS: I think it is immaterial. We have the full number; but death, removal and failure to elect members has caused this change. While it does not make any difference in our business, we would like to have representatives from every county. But the dropping out and changing has caused this irregularity in the business and I would move that the Secretary be requested to look this matter up, and when members are elected from counties not now represented, make a suggestion to them that they elect their members for such a length of time, which will readjust the condition of things at the present time.

Motion seconded and adopted.

MR. S. S. BLYHOLDER: My county would then elect me for two years; would that be a legal election when the law says he shall be elected for three years?

The SECRETARY: The motion is to suggest to the Secretary that he shall fix this up; and he will certainly fix it up according to the law.

MR. MATTHEW RODGERS: That was my idea.

The SECRETARY: I haven't any idea but that the Secretary, whoever he may be, before he tackles the legal question will see the Attorney General.

MR. MATTHEW RODGERS: Of course it is known to the members of the Board now that Mr. Naginey is dead; but I wish to notify you officially—I was at the funeral and saw him buried—I had the honor of being one of the pallbearers, and it was a very sad funeral, very largely attended. While it was a pretty cold day, his neighbors and friends and the citizens all turned out and spoke to each other with great respect for the gentleman who died, and I think it would be advisable for us to have a Committee appointed to pass some short resolutions representing the feelings of this Board in regard to the loss of him who was such a useful member and a good man in his home community and every place he went, at this meeting. And while I am speaking I would just like to say that you will find this man Smith a very fine man; he is one of the most aggressive truckmen that we have in all of our country there. He was a railroader and left the railroad and bought a small farm of ten acres and has improved it and brought it to such a high state of perfection that he gives work to his family, all of whom are large, and has to hire more help. He is a success.

The CHAIRMAN: Do you put that in the motion?

MR. MATTHEW RODGERS: No, I just move you that a Committee be appointed to draft resolutions in regard to the death of Mr. Naginey.

The SECRETARY: Before the vote is taken on that motion, I want to say that Mr. Rodgers attended that funeral—no doubt he intended to attend it anyhow—but he attended that funeral as a representative of the Board. I think that when the time came I found it impossible for some reason to attend myself and knowing that Mr. Rodgers was not very far away, I wrote and asked him to go as a member of the Board. Is that correct?

MR. MATTHEW RODGERS: That is correct.

The SECRETARY: So that Mr. Rodgers was there as your representative, and I think it is fitting and proper that we should appoint a Committee at this time. I do not want to forestall anything that the Chairman may have in his mind, but I would like to see Mr. Rodgers Chairman of that Committee.

The CHAIRMAN: That is satisfactory to me.

MR. MATTHEW RODGERS: In regard to what the Secretary has said, I would say that I did comply with the request of the Secretary and I did go and see the family and present the good will and feelings of this Board in regard to the death of the husband of Mrs. Naginey, and met her children and other relatives and friends and we had a consultation separately.

MR. JOEL A. HERR: When the motion is put I would like to state that it has been customary and I think it is prudent that such memorials should be presented at the annual meeting. This is the only meeting we will have to-day; the Committee will not have time to prepare memorials to be presented to this meeting and adopted. Therefore, I move that the subject of memorials be referred to the annual meeting.

Motion seconded.

The CHAIRMAN: This Committee can be appointed and make the report at our annual meeting, Mr. Herr.

MR. JOEL A. HERR: Mr. Chairman, I want to state that a short time ago we lost our Ex-Secretary, Thomas Edge, and I think a suitable memorial ought to be prepared for him and I think the same Committee that does one ought to do the other. There may some of the rest of us pass away before next meeting and there will be a Memorial Committee appointed at that time. I have no objection to Mr. Rodgers being on the Committee or Chairman of it, and in the meantime, he might be prepared to report, but I only want to say that there will be a Memorial Committee appointed and there will be other memorials besides Mr. Naginey's, therefore, I think it is more fitting that it be made at the annual meeting.

Motion carried.

MR. B. F. KILLAM: I believe that we have the other motion, that the Committee be instructed to report at our next annual meeting.

The CHAIRMAN: That motion was made.

Motion seconded and adopted.

The CHAIRMAN: Mr. Rodgers will be Chairman of the Committee; Mr. Blyholder and Mr. Joel A. Herr will also be members. Gentlemen, is there any other business?

The SECRETARY: I move that we adjourn; but before adjournment, I want to say that the Governor of the Commonwealth, who is President of the Board, sent his greetings to this meeting and asked me to say to the members of the Board that he was very sorry that he would be unable to attend; that he had the meeting in mind and was trying to make arrangements to get here, but being so pressed during the last days of the session of the Legislature it was impossible for him to get off on account of certain other work that had to be done, and then he called my attention to the fact that he had only 30 days to consider all the bills left on his hands and make the adjustment of the appropriations so they would fit in with the revenues of the State. He wanted to be remembered to the Board, stating that he appreciated the Board's work, and that while you were working here for the advancement of the interests of agriculture, he was at the other end working along the same lines. I had nearly forgotten to deliver this message, but I am glad that it came to my mind before our adjournment.

There is one other announcement I want to make. I received, since I came here, a letter from our good Brother Schultz, the Pennsylvania Dutchman, from Montgomery county, and he expressed sincere and heartfelt regret that he cannot be here and enjoy the good things of this occasion, the meeting with the brotherhood, and he made the statement that the reason why he could not be here was on account of his wife having undergone a very painful and dangerous operation at the German Hospital and he feels, and feels rightly, I know we will all be ready to say, that his place is right there with her at the present time, so he cannot be with us.

DIRECTOR MARTIN: I am informed that the auditorium is now placed in order for our meeting at half past one o'clock this afternoon.

The CHAIRMAN: All understand we will meet at the auditorium at 1.30.

The SECRETARY: I move to adjourn to meet at the auditorium at 1.30.

Motion seconded and adopted.

N. B. CRITCHFIELD,
Secretary.

LIST OF COUNTY INSTITUTE MANAGERS FOR THE SEASON OF 1915-16.

County.	Name and Address of Chairmen.
Adams,	A. I. Weidner, Arendtsville.
Allegheny,	C. L. Hood, Coraopolis, R. D. No. 3.
Armstrong,	S. S. Blyholder, Kelly Station.
Beaver,	Walter C. Dunlap, West Bridgewater.
Bedford,	W. F. Biddle, Everett, R. D. No. 2.
Berks,	H. G. McGowan, Geiger's Mills.
Blair,	W. Frank Beck, Altoona.
Bradford,	F. D. Kerrick, Towanda, R. D. No. 9.
Bucks,	B. F. Wambold, Sellersville.
Butler,	W. H. Milliron, Euclid.
Cambria,	L. H. Bearer, Hastings, R. D.
Cameron,	R. P. Heilman, Emporium.
Carbon,	Edward Lienhard, Mauch Chunk, R. D. No. 1.
Center,	John A. Woodward, Howard.
Chester,	M. E. Conard, Westgrove.
Clarion,	J. H. Wilson, Clarion.
Clearfield,	Harrison Straw, Clearfield.
Clinton,	Joel A. Herr, Millhall.
Columbia,	A. P. Young, Millville.
Crawford,	W. F. Throop, Espyville.
Cumberland,	T. J. Ferguson, Mechanicsburg.
Dauphin,	E. S. Keiper, Middletown.
Delaware,	Thos. H. Wittkorn, Media.
Elk,	John G. Schmidt, St. Marys.
Erie,	Archie Billings, Edinboro.
Fayette,	John T. Smith, Dunbar, R. D. No. 32.
Forest,	C. A. Randall, Tionesta.
Franklin,	J. P. Young, Marion.
Fulton,	Frank Ranck, Hancock, Md.
Greene,	J. W. Stewart, Jefferson.
Huntingdon,	G. G. Hutchison, Warrior's Mark.
Indiana,	S. C. George, West Lebanon.
Jefferson,	Peter B. Cowan, Brookville.
Juniata,	Matthew Rodgers, Mexico.
Lackawanna,	Horace Seamans, Factoryville.
Lancaster,	J. W. Bruckart, Lititz.
Lawrence,	Sylvester Shaffer. New Castle.
Lebanon,	Edward Shuey, Lickdale.
Lehigh,	P. S. Fenstermacher, Allentown.
Luzerne,	J. E. Hildebrant, Dallas.
Lycoming,	A. J. Kahler, Hughesville.
McKean,	E. A. Studholme, Smethport.
Mercer,	Wm. C. Black, Mercer.
Mifflin,	C. M. Smith, Lewistown.
Monroe,	F. S. Brong, Saylorsburg.
Montgomery,	J. H. Schultz, Norristown.

County.	Name and Address of Chairmen.
Montour,	J. Miles Derr, Milton, R. D. No. 1.
Northampton,	C. S. Messinger, Tatamy, R. D. No. 1.
Northumberland,	I. A. Eschbach, Milton, R. D. No. 1.
Philadelphia,	David Rust, Horticultural Hall, Philadelphia.
Perry,	C. M. Bower, Blain.
Pike,	B. F. Killam, Paupack.
Potter,	A. T. Crittenden, Oswayo.
Schuylkill,	John Shoener, New Ringgold.
Snyder,	F. F. Glass, Freeburg.
Somerset,	Robert W. Lohr, Boswell.
Sullivan,	E. R. Warburton, Campbellville.
Susquehanna,	F. A. Davies, Montrose.
Tioga,	C. H. De Witt, Mansfield.
Union,	J. Newton Glover, Vicksburg.
Venango,	W. A. Crawford, Cooperstown.
Warren,	G. A. Woodside, Sugargrove.
Washington,	Jas. M. Paxton, Houston.
Wayne,	W. E. Perham, Varden.
Westmoreland,	W. F. Holtzer, Greensburg.
Wyoming,	G. A. Benson, Tunkhannock.
York,	G. F. Barnes, Rossville.

LIST OF INSTITUTE LECTURERS FOR SEASON OF 1914-15.

Anderson, H. M., New Park, Pa.
Barnitz, C. M., Riverside, Pa.
Bond, M. S., Danville, Pa.
Campbell, J. T., Hartstown, Pa.
Card, Fred W., Sylvania, Pa.
Conard, Dr. M. E., Westgrove, Pa.
Cooke, Prof. Wells W., U. S. Department of Agriculture, Washington, D. C.
Darst, W. H., State College, Pa.
Dorsett, E. B., Mansfield, Pa.
Fassett, F. H., Meshoppen, Pa.
Faust, S. L., Hoboken, Pa.
Funk, Sheldon W., Boyertown, Pa.
Gooderham, H. M., Patton, Pa.
Groupe, J. Stewart, Jersey Shore, Pa., R. D. No. 4.
Herman, J. A., Fombell, Pa.
Herr, John D., Lancaster, Pa.
Horrocks, Wm., Souderton, Pa., R. D. No. 1.
Hulsart, C. C., Matawan, N. J.
Kline, Frank, Spring City, Pa.
Lighty, L. W., East Berlin, Pa., R. D.
Lyons, Dr. Hannah McK., Lincoln University. Pa.
Mairs, Prof. T. I., State College, Pa.
McCallum, M. H., Wernersville, Pa.
Menges, Prof. Franklin, York, Pa.
Mitman, Howard, Hellertown, Pa.
Noll, C. F., State College, Pa.
Orton, C. R., State College, Pa.
Patton, W. M., Mosgrove, Pa., R. D. No. 2.
Phillips, E. L., New Bethlehem, Pa.
Phillipy, Dr. W. T., Carlisle, Pa.
Putney, Fred S., State College, Pa.
Rabild, Prof. Helmer T., U. S. Department of Agriculture, Washinton D C.
Row, Chas. A., Yardley, Pa.
Seeds, Robt. S., Birmingham, Pa.
Smith, R. S., State College, Pa.
Stout, W. H., Pinegrove, Pa.
Struble, Vern T., Athens, Pa., R. D. No. 24.
Tomhave, W. H., State College, Pa.
Van Noy, Leon Otice, Troy, Pa., R. D. No. 66.
Watts, D. H., Kerrmoor, Pa.
White, John W., State College, Pa.
White, W. R., State College, Pa.
Wittman, W. Theo., Allentown, Pa.
Worthen, E. L., State College, Pa.
Wrigley, Paul I., Eddington, Pa.

PROCEEDINGS OF THE FARMERS' ANNUAL NORMAL INSTITUTE, HELD AT EXPOSITION PARK, (CONNEAUT LAKE) PA., MAY 25-27, 1915.

Exposition Park, May 25, 1915, 1.30 P. M.

Director Martin in the Chair:—

The CHAIRMAN: Friends, the time has arrived for opening the exercises of our Annual Normal Institute. The presiding officer will be Mr. W. F. Throop, the County Chairman of this county.

Mr. Throop takes the Chair.

The CHAIRMAN: Ladies and Gentlemen: It is a pleasure to me this afternoon to meet such a body of people as we have here, though I would be far better satisfied in my own mind if some of the older members of the Board had taken the Chair. But with your help we will try and make the meeting a success, as we hope it will be. First, we have this afternoon the Address of Welcome, and it is with pleasure that I introduce to you Mr. James E. Reany, President of the Chamber of Commerce of Exposition Park.

MR. JAMES E. REANY: As President of the Board and on their behalf, I wish to extend to each and every one of you a most cordial welcome. We feel especially proud to have you among us and trust that your stay will be one to be remembered. We especially appeal to those members who have come from some remote part of the State, because we are very proud of this particular section and of our beautiful little body of water here, which we feel is unsurpassed in natural beauty anywhere in the country; and those who come from the eastern part of the State, where water is rather a scarce article, we want you to carry back with you a lasting remembrance of this place.

I feel that there is a wonderful opportunity now for the farmer. It seems to me that the United States very soon will become the granary of the world. An agricultural buying movement no doubt will soon be inaugurated that will be stupendous in character, and it behooves every man of agricultural inclination, to set himself about the task of "setting his house in order," in order to provide himself with all the knowledge and apparatus necessary to promote the agricultural interest of this vast country. Europe, being devastated by war as it is to-day, is reduced to a very unproductive state, agriculturally, and I believe that this country is destined to supply the sustenance of the world in no mean degree, and it gives me personally a great deal of pleasure to commend to every man the excellent work that these institutes and the Board of Agriculture are able to perform.

It is absolutely necessary that everyone pay some attention, some heed to agricultural pursuits. The day has passed when things are being done as our grandfathers did them. The schoolmaster has been abroad in this country and it is essential that we all appreciate that fact. We all realize that we have a great many men in our several Bureaus of Agriculture devoting their time and their energy to the advancement of this fundamental industry, the primary work of any country, and I trust that this meeting will be productive of an immense amount of good; that you will all carry back with you something to be remembered, some information of a useful character, something you can apply to your everyday needs, and that you will carry with you also a remembrance of our beautiful little resort. I bespeak for every man, on his part, his hearty co-operation and good will in the furtherance of this convention.

The CHAIRMAN: We have another gentleman from Crawford county who has been a tireless worker in the interests of agriculture, and I assure you it is a great pleasure to introduce the Hon. R. C. McMaster, of Adamsville.

MR. McMASTER: Mr. Chairman, Ladies and Gentlemen of the Farmers' Normal Institute: I am glad to have the pleasure of saying a very few words of welcome to you to-day. Being introduced to an audience always reminds me of an old story that I heard related of Josh Billings. Josh Billings was a humorous lecturer of some years ago and he was engaged by a club down at Plainfield, N. J., to deliver a lecture, and the club had selected a young man of great ambitions to introduce Josh to the audience. When the time came for the introduction, the young man appeared all togged up in great shape and seemed to think a great deal more about himself than he did obout Josh, and he commenced in this way, becoming somewhat confused as to what he was there for, said: "I am not Josh Billings, nor his wife, nor his son, nor his daughter, nor his man servant, nor his maid servant, nor his ox"—and there he stopped and left old Josh to wade out.

My friends, it is my pleasure indeed to welcome you to old Crawford county. We feel proud of old Crawford county. It is written of the county that it has been the best dairy county in the State of Pennsylvania. We welcome you here. We welcome you to Conneaut Lake, the most beautiful and the largest lake in the State of Pennsylvania. We welcome you here for what you represent, the whole State of Pennsylvania, which is a good deal. We welcome you for the purpose that you come here. You come here for the exchange of thought which elevates mankind. You come here, as I understand, for the diffusion of knowledge along the line of farming, which has done so much in the past for the farming interests and will continue to do more in the future.

The farming interest is the greatest industry in the world; it has been so since Adam hid behind the apple tree, and will continue to be so. It is the industry upon which all other industries, great industries, are founded. It is the foundation of all other industries, and it is the industry that feeds the world and will continue to feed the world, and we trust that your meeting here will be profitable along this line, the exchange of thought which helps along, which has done so much in the past. As one item occurs to me recently, I can remember in these beautiful valleys and hills of ours here at this time of the year when your meadows were red with soil, ruined with soil, that would not produce one quarter of a crop and farmers that I talked with did not know what to do and had no remedy to overcome it at that time, but now, through influences just like you exercise, the distribution of knowledge, the diffusion of knowledge, that has all been overcome to a great extent and these same meadows now are producing bountiful crops. This is only one result of one item of your line and there are many and we are pleased to have you work along this line. We hope that your meeting here will be pleasant and will be profitable to all, and we welcome you to Conneaut Lake and Exposition Park, to our magnificent hotels, and trust that you will go away pleased that you came.

The CHAIRMAN: We have another member with us here from Crawford county whom I believe it would be an injustice not to call upon for a few words, our brother granger and institute worker, Brother J. T. Campbell.

MR. CAMPBELL: Yes, I did want to say a word of welcome to you people and my friends, I am sure, and I have no speech—I did think a while ago I might get up a little speech for this occasion but I thought I might spill over, so I haven't any speech at all. I did make out a few notes as I was sitting here listening to the others on this welcome.

In the first place I want to say that I welcome you here, first and foremost, for the manhood and womanhood that your represent. I have reason to believe, I believe I can safely say that I have a personal acquaintance with every one of you, and I know whereof I speak in that respect and because of the sterling qualities of manhood and womanhood that your represent, I welcome you to Crawford county as a farmer; we need you, we need men like you, we need your influence here as well as the things that you have that contribute to better farming because it is not all of the subject of farms to go out and be a better farmer and till the land a little better than it has been tilled before; far from it, and we know that the great work of the Farmers' Institutes in Pennsylvania has not stopped there. And let me say to-day, while we are in a section of Pennsylvania that is more newly settled, not quite as old a country as the part of the State on the other side of the mountains from which many of you come, I want to assure you that the Indians at the present time in this section are all peaceable, as far as that goes, you need have no alarm in that direction.

I do want to say that we have a good country here, not as well developed as it might well be in the future, without any doubt. I have traveled about a little, studying agricultural conditions and have been in almost every county of the State and in almost every county of two or three other states and I can safely say that I think we have a land here with great possibilities, much of which has not been fully developed. Not a great while ago I spent a week in northern Illinois and visited many farms, and the farmers told me their land there would bring $200 to $300 and acre readily. Our land is not bringing these prices; we have fairly good land, not so well improved perhaps, but it can be bought at $50 to $60 an acre and you can spend $50 an acre more on it in the way of drainage and improvements and have land at a cost of $100 an acre that I feel perfectly safe in saying will yield more net profit to the acre after the expenses are taken out than the $300 an acre land in northern Illinois will yield, as far as agriculture goes. So we need men to develop these possibilities to a greater extent than they have been developed in the last few years.

We welcome you because you have brought better agriculture and better home conditions, the things that really amount to so much. You are in a land to-day where a large percentage of the farmers own their homes and have them paid for. You do not find the fat of the land oozing out as readily as in Lancaster county, but they get the results nevertheless. You can go into many many homes in western Crawford county to-day, though they are not pretentious, though they are not mansions or palaces, and you will find all the modern conveniences in the way of modern heating appliances, good lighting systems, bath room equipments and all those things. We do not need to be told that there are a whole lot of us who need these things, we realize that and we know the blessings that go with them. What we need is some help to tell us how to acquire some of these things; that is the problem we are up against to-day. It is illustrated by the fact that when milk in this county brought a little less than three cents a quart, good Jersey milk, that not far away is bringing eight and ten cents from the consumers—we need some of that profit and we will have more when we get our share. One of the great things we are up against in western Crawford county, is the question of who is going to help the farmer win his battle. That is the question that is coming up for solution. We believe to-day that the organization that you represent is going to have a part in that direction, must have a part in that direction. We welcome you here then because we believe you are able to help us in that direction and we look to you for some help along these lines.

Then, further, I want to say, personally, that I welcome you here because of what you have been to me as brothers and sisters in this work. I do not have to go back very many years in my life till I recall the time when I started out to try to do a little Farmers' Institute lecture work and my first attempt fell rather flat and I realized that I was a failure along that line and wanted to give it up and friends like Brother Lighty and Brother Seeds took me and stood my feet on a rock along these lines and I shall always feel under an everlasting debt of gratitude for their help and strength in that direction and the help that comes from all of you in this great association work. And again I should have been very much pleased if it had been possible, by some arrangement, that I could have had you all over to Woodbine Farm for a short time at least, but it did not seem possible to make an arrangement of this kind, but I hope that many of you as possibly can will find it convenient to make a short visit at least before your return to your homes and we shall be glad to see any and all of you who can come. We are not doing great things over there, not running a show place or anything of that kind, but we have accomplished some results by patient effort and hard work along the lines we have been working in the past few years and we feel that our work is only well begun.

It is sometimes said that a Farmers' Institute lecturer ought to be a good farmer, and so he should; but a man ought also to be a good farmer because he is a lecturer. It is a rule that works both ways and I feel when I go out into the work of the Farmers' Institutes I endeavor to put into my work the very best that I can. I feel that my efforts are feeble along that line many times, but I oft-times feel that if I were able to give to the State of Pennsylvania and its agriculture and those with whom I come in contact, as much as I have received in the work, then I should feel that I have accomplished a great measure of success; but I am sure I will never be able to give out as much as I have received, in this work. If you will come over, any and all who can, you will find a hearty welcome when you come to Woodbine Farm and we are trying to put into practice there the results of what we have found out in our work on the farm.

Let me say in closing. In my contact with institute work in the State of Pennsylvania, in my contact with institute workers in quite a number of other states, I can safely say that I think in broad-minded spirit and in ability to look at the great questions of agriculture from every side, that I know of no body of men and women in this country to-day that take the broad-minded and all-sided view of the great agricultural questions that is taken by the great agricultural institute workers of the United States in general, and I know that that especially holds good in the State of Pennsylvania. I am not going to find fault with the specialist or anything of that kind. The specialist is a useful man and has accomplished a great work in Pennsylvania and in this country to-day but you know and I know that many times the man that specializes intensely, where he may know a whole about his particular special line, it is not always possible for him to see the relationship of his special problem to the other problems in general and because of his inability to see his proper relationship in this light, he does not grasp the full situation sometimes that is grasped by the man who does not devote himself so closely along one special line.

Now a word as to the future work of the institute. I hope that this meeting here—I know this work will be constructive because we have great opportunities and great possibilities along this line and great problems yet to be worked out and great work to be done by the Farmers' Institute workers of the State of Pennsylvania. I am aware in some states that there are those to-day who would undertake to say that the Farmers' Institute movement of our country has accomplished its work and should be abandoned. A few months ago I heard a man undertake to hold the funeral obsequies of the Farmers' Institute work of the United States, and right then and there I was reminded of that old saying of Gordon Graham, that the first requisite of a quiet funeral was to have a willing corpse, and you know as well as I that the corpse in Pennsylvania is not by any means willing. We welcome you because of the work yet to be done by the Farmers' Institute of Pennsylvania. I want to welcome you, County Chairmen, because of the many kindnesses and courtesies you have extended to me as I have been with you in the various counties, and perhaps there is not another State in the Union to-day that has a similar body of men, willing to serve without pay, giving one to four weeks of their time to the advancement of the agriculture of our great Commonwealth without any pay whatever, in order that this work may go on. It certainly speaks well for the Commonwealth of Pennsylvania, it speaks well for the future of agriculture that Pennsylvania is able to have a body of men like this, and as I have mingled with you remembering the many kindnesses and courtesies that you have shown me I extend a special welcome to western Crawford county. I know there are times when this Institute work does not move along as smoothly as it might and the county chairman gets a whole lot of blame too, but it is the man that does the best that gets more kicks than all the rest and after all a man that does something is always going to get some kicks, if there is any consolation in that, you have it.

So with these remarks—and there are other things that I might have said—but do not forget that we extend to you a most hearty welcome here at this time and want to take part in this meeting and want to go out from this meeting the very best results that have ever gone out from a meeting of this kind and as far as we are able at least to contribute in that direction, we are going to do it. Many of the mistakes we make—and we will make them and always have made them and you are going to make them—they are mistakes not of the heart at least, and just consider them in that light, and so we extend to each and every one of you both lecturers and county chairmen and all of you a most hearty and most cordial welcome.

The CHAIRMAN: For response to the gentlemen who have spoken, I have the honor of presenting to you the Hon. A. L. Martin, Director of Institutes.

DIRECTOR MARTIN: Mr. Chairman and gentlemen who have so generously offered us everything that is in and around Conneaut Lake and extended us a hearty and generous welcome; I may say that in traveling over Pennsylvania for the past 16 years I have sometimes been led to think, at least, that if there was a possibility of partiality not on the part of the Lord in the blessings that he bestows upon his people, it was first that we were given a home in a state like Pennsylvania; and then again after looking more closely into the various conditions, educational, social and along broad agricultural lines, I have been led to know that in every single county of the State there seems to be some special benefit bestowed not quite common to the other counties. And now as we come into Crawford county, I have been led to believe, not only to-day but upon other occasions, that if that partiality were at all possible that Crawford county was blessed at least in some things beyond most of the counties of the State of Pennsylvania.

What are some of these things? First, Crawford county has the advantage which some other counties do not have, of access to a higher education by your educational institutions; it has access to as good, if not the best, common schools within the State, and you have a soil, or rather I should say, you have farm homes unexcelled, except by the most costly, but real farm homes unexcelled by any other county of the State. And more than that, you occupy one of Nature's beauty spots in Pennsylvania where we are holding this meeting; the largest inland water of the State is here, beautiful in all its surroundings and a piece of water of utility as well, where we can come from all the counties and all parts of eastern Ohio and western Pennsylvania, and where the teeming multitudes in our cities seek constantly for a place of wholesome recreation. Here, at Conneaut, is one of those beauty spots that Nature has bestowed upon you for your benefit and for the benefit and uplifting of mankind.

Now, my friends, what should we say of the outlook? Agriculture—what is it? What does it represent to-day? Do you not know that it has a broader horizon, it has a brighter prospect than ever before in its history? Do you not know that every thinking man and woman to-day in this country of ours is thinking and writing and talking about the farm and farm life? What does that mean? Some of these Associations have undertaken, even though they exist in cities and towns, the task of giving us farmers an uplift. We are pleased with the thought. We are pleased with the knowledge, that at last the whole world has come to its proper senses and that it is admitted and proclaimed that the occupation that we represent here to-day is the one great occupation upon which all mankind, all trades, all industries and pursuits must look for their own upbuilding. Does that, my friends, give you any conception of the vast responsibilities that rest upon you and me and every man and every woman who cultivates a foot of God's earth?

What are some of our responsibilities? I should say that the man who is year by year cultivating that acre and not improving its productive power and force is not living up to his divine commission. The man upon one of God's acres here to-day in Pennsylvania that is not increasing its powers is in some sense robbing God's earth; and we are here to-day, my friends, to devise ways and means by which we may magnify the powers of the acre. We are here for greater things than even that. The improvement of the soil comes first of course. Then there may come another improvement; the greatest improvement that can come to the farmer life of Pennsylvania, is to improve the social, the educational, and, if you will, the spiritual life upon the farm. What are the agencies? The school. What should it be? When I say the school, I mean that school that you and I attended when we were boys and girls. I mean that country school and that country schoolhouse. Do you know that more depends this day and age and generation in which we live, upon the mental and moral equipment of that boy and girl than any other one thing that you can name? I sometimes think that we have gone to a little extreme in the direction of looking after the animals on the farm and the crops on the farm and the disposition of the same—that we went a little too far, further than we have gone in looking after the conditions of the schoolhouse and equipment of that school and the preparation of our children and their equipment to fight the great battles of life as they will be called upon to meet them.

Then there is that other thought; the social side of our lives. We farmers, amongst all the other occupations and businesses of life, live our lives in a certain measure separate, as it were, the one from the other. Oh, how important it is in all this work that we have community interests somewhere, the social center somewhere, handled and governed and controlled by the wisest and most discreet men and women of all that community, who shall lead along and lead up the youth of that community to a desire for the highest order of social life in that community. Do you think of all these things in that way?

Then again that other part, and I ought to call it the part performed by the country church. It has been my privilege for the past 16 years to travel up and down and all over Pennsylvania—indeed I can see its beauty spots here and there all over the State—and consider these things; and Sabbath Day, as my custom is, I go into the country church where I am stopping and have observed some things; I have observed that the attendance at that little country church has been for years on the decline and is to-day less than it was a decade or two ago. What is the reason for all this? Are we not a pious people? Do we not love spiritual things? I cannot believe that we do not. But what is the reason for the decline in the attendance in that country church? I will give you a thought upon that: It is that occasionally, and I do not want to censure the ministry, far from that, my own mother taught me better than that, but one of the reasons, in my judgment, for the decline in the country church is, that a certain proportion of the ministry in these country churches have never studied the interests and principles of agriculture. Why sometimes I have heard these ministers undertake to pray as men of prayer and their prayer breathed not the spirit of the husbandman but rather an excuse for it, and if the day comes, my friends, when the country church will occupy the place the Lord intended it should occupy in agriculture, it will be when the ministry thereof have made a study of the great principles of agriculture, and they can live and act in a sphere of sympathy with the great work in which you and I are engaged, and that church will become not only a religious but a social center, together with the schools of the country, gathering in the young and the old in one grand social and religious action. Then, together with the knowledge attained through the study of the great principles of agriculture by the great organization of Farmers' Institute workers and other agencies, then may we expect, my fellow farmers, to have agriculture stand up as a beacon light to every other industry and occupation as the one occupation blessed of God and sanctioned and upheld by all other industries, and we ourselves having the highest conception of the noblest work ever entrusted to mankind.

But I want to turn again to this beautiful, splendid Crawford county. You have some things here in great abundance. You have a soil easy of cultivation, ready of response to your touch; but you need some things that you do not have, in my conception of the matter. If the farms of Crawford county were underdrained as they should be, every acre of all these farms in the county would double its production. Do you believe that? They would double their production. Hence, I am firm in stating, first, underdrainage; then careful cultivation. But I guess you are going to get more water over here pretty soon and I don't know what to say about it; but I do say that if I had the privilege of the cultivation, after it was underdrained, of Pymotuming Swamp for ten years, I was going to say I would pay the National debt. But I am going to say to you that your thousands of acres in that, embrace land than which in the United States there is not a better prospect for growing the vegetables that the world consumes, than this old swamp, if it were underdrained; but you are going to cover it with water to help feed some splendid manufacturing plants. That looks all right. But here is the question for you to solve; if you underdrain it you will get all the water that is there, won't you, and let it run down into the Shenango and let us dam the Shenango and cultivate this splendid outlook for old Crawford county. That runs a little counter to some teachings. It is my conception of it, that is all.

Gentlemen of Crawford county, you have your own problems to solve. We are here as an organization of the Farmers' Institutes, representing a part of the State Government of Pennsylvania to help you with any of the problems you have. The sessions of this Institute will be open until Thursday night and we trust that you will bring these problems here and let them be freely discussed. This is no star chamber association, it is for open and free discussion of all the great problems that confront us in agriculture.

Now, my friends, I have talked altogether too long. I suppose I will talk a good deal more at some other sessions of this meeting; but we are indeed gratified to receive so generous a welcome from Crawford county and we are glad to meet on this beautiful location and I am sure we will all go away feeling that it was good for us to be here. I thank you.

The CHAIRMAN: I take pleasure in presenting to you one whom, I believe, needs no introduction to the farmers of Pennsylvania, Mr. L. W. Lighty.

MR. LIGHTY: Director Martin, Mr. Chairman of the Chamber of Commerce, Mr. McMaster, Mr. Campbell: I certainly want to thank you very heartily, thank you for myself, and thank you for the State Board of Agriculture, the members of the Institute Committees of the various counties and Institute lecturers for your kind words. You know words of welcome when we come into a strange country are always very pleasant. Nevertheless, I want to say that I do not feel as though I was in a strange country; I rather feel at home in Crawford county, possibly because about fifteen or sixteen years ago I came to this county the first time I was far away from home, because I am from that distant county—had never been across the mountains—but the people of the western counties and particularly the people of Crawford county, treated me so royally that I felt at home and I kind of feel at home to-day; I almost felt at home yesterday, even more so to-day, because the sun is shining warmer to-day than it did yesterday and even that is welcoming us as well as your bright smiling faces.

Now I have no speech prepared; I am glad I haven't; I can only second what has been said so much better than I could possibly say it and I do want to say that I am very glad to see so many of the old friendly faces here this afternoon and I want to say to these people at Conneaut Lake Exposition grounds that you are welcoming some of the good old war horses of agriculture in the State of Pennsylvania, men who have worked for many years, not including myself, please, but quite a number of the old members of the State Board, the old County Chairmen that I have been working with side by side for a number of years, and when you welcome those old war horses in the agricultural world of Pennsylvania, you are welcoming mighty good men. And members of the State Board, as it has been stated already, are in this work for the love of the work, they do not expect any pay and they do not get any pay. They spend a week, they spend two weeks, they spend a month in real, genuine hard labor in the upbuilding of the agriculture of their various counties. The President of the Chamber of Commerce called our special attention to the great amount of water, this beautiful large sheet of water, and from what he said, I think that he possibly is laboring under a misapprehension; he imagines that we do not have such a great abundance of water over in the eastern end of the State. While it is not a quiet body of water, we have a broad stream about one and a half miles wide flowing down through the eastern half of the State and we have a great abundance of it continuously. Maybe that is explained because we do not drink much of it over in the eastern part of the State. But we are glad to be welcomed over here into your very beautiful country west of the Alleghenies, particularly in Crawford county. I think that really it is the heart of the country west of the Allegheny Mountains.

Now, I believe you are going to have a first class good meeting I do not want to consume too many minutes of your time. You have a splendid program. You have a free platform as was stated by the Director of Institutes and that is the good part of the Farmers' Institute and the Farmers' Normal Institute, the free platform where you are at liberty all the time to ask questions and I hope you will make good use of the time and your privilege. Again I thank you, thank you sincerely for the cordial welcome that you have extended me.

The CHAIRMAN: The Director of Institutes informs me that it will be impossible for Prof. Helmer Rabild to be with us at this session, so we will take up the second subject on the program, "Diseases of Farm Animals," by Dr. C. J. Marshall, State Veterinarian, Department of Agriculture, Harrisburg.

DR. MARSHALL: Mr. Chairman, Ladies and Gentlemen: Not long ago Mr. Martin asked me if I would attend the Institute and read a paper or talk on some subject before a meeting that was going to be held at Conneaut Lake. Whenever I hear the word Crawford county mentioned, I think of associating it in some way with stock breeding. I know that Crawford county is one of the best horse raising counties in the State, and stock raising is one of your industries, and for that reason the subject suggested itself that I should discuss here this afternoon. I prepared a paper on the subject of Infectious Abortion. I hope none of you have ever had any experience with it, but I know that we do have considerable trouble with it in certain parts of the State and I trust it will be interesting to you.

Dr Marshall then presented the following paper:

INFECTIOUS ABORTION

DR. C. J. MARSHALL, *State Veterinarian.*

Among the many perplexing diseases that afflict our livestock, the subject selected for consideration to-day is one of vast economic importance. It has been conservatively estimated that infectious abortion exists in about 20% of the breeding herds in this country. Practically 50% of the pregnant animals in newly infected herds abort. In some cases as high as 100% have been known to abort in certain years. The losses in young animals year after year in infected breeding herds are placed at 20%, and the money losses in infected herds is averaged at about $35.00 per head. In dairy cows that abort there is a decrease in the amount of milk produced. The act is likely to be followed by temporary or permanent sterility, udder diseases, septic condition of the uterus and a total loss of many calves.

This form of abortion has been known to be infectious for more than a century. The "Complete Farmer," an agricultural paper published in England, speaks of the disease as contagious as early as 1807. Sensible advice was given in this article in reference to its spread and how to control it. Professor Bang, of Copenhagen, who has done so much good work on many important diseases of animals and especially tuberculosis, discovered the true cause of the disease in 1896. The organism that causes it has been named the bacillus of Bang in honor of its discoverer. His discovery has since been verified in many countries. It has been found in practically all countries where cattle are kept. True infectious abortion in cattle is always due to the bacillus of Bang. The disease is found in nearly all species. In animals except bovines, however, the dissease is not due to the bacillus of Bang. True infectious abortion of cattle has been transmitted experimentally to other species but under natural conditions that of one species of animals is not carried to another. It is uncommon to find two or more species of farm animals afflicted with infectious abortion at the same time. The disease is of the most importance in bovines. Mares are not seldom afflicted with a form of infectious abortion in the horse breeding sections of Pennsylvania. Abortion in animals has been recognized for centuries. In the XXXI chapter of Genesis, the 38th verse it speaks of sheep and goats casting their young. The condition is not always due to infection. Isolated cases are usually due to fright, injury, certain poisons, diseases like anthrax, foot-and-mouth disease, excessive activity of the milk gland, etc. The relative frequency of infectious abortions as compared with those due to accidental causes has been observed by one veterinarian who kept a record of three hundred cases. He found that two hundred and eighty were due to infection and the balance to other causes.

Breeders frequently speak of the condition as slinking, slipping, casting, picking, etc. The disease is easily recognized in a herd. It is not so easy to pick out the infected animals. The diagnosis is usually made by the history. Where several animals abort during the season and no other cause can be found, one is usually safe in judging it to be due to infection. It may occur any time during pregnancy, but is most common from the fifth to the seventh month. The average period of gestation at which 240 cases aborted was 6¼ months. Young cows are more liable to abort than the older members of the same herd. Other valuable observations made on the 240 head of aborters showed the average age at which it occurred to be 4½ years, 8% aborted a second time, 2% the third and 168 retained the afterbirth. No symptoms are observed usually till just before the act. They vary to a certain extent with the period of gestation. In the early stages no clinical symptoms may be detected while toward the end of gestation they simulate more closely those of normal parturition. The calf may live any time after the seventh month of the period of pregnancy. Seven months calves are said to be more liable to live than those dropped at the eighth month and usually thrive better. Aborted calves are, as a rule, ballers, thrive badly and die or should be destroyed as worthless.

In order to detect infected individuals in a herd, laboratory methods are useful. Many different plans have been tried, but up to the present the best results have been obtained by an examination of the blood or what is known as the complement fixation test. It has been possible with this test, to detect practically all of the infected animals in a herd. To do this work properly it is necessary to have a laboratory well equipped and a man especially trained in bacteriology. Our State is fortunate in being provided with the necessary equipment for studying this disease and many others that are difficult to diagnose. In large breeding herds where the owner desires to eliminate contagious abortion, this test is practically the only alternative. By its use infected animals can be segregated from those that have recovered or that have not yet become infected.

It is possible to establish a diagnosis of the disease in a herd from a post-mortem and laboratory examination of the foetus, foetal membranes, etc. In formation obtained in this way is too late to be of practical service.

In order to control the disease it is necessary to consider the various ways in which it has been spread. There are several important factors. It should be remembered that the bacillus of Bang is the only cause of the disease in cattle; that it lives, thrives and multiplies in the foetus, the fetal envelopes and uterus, and that it lives but a short time outside of the pregnant animal. This is one important reason for not breeding infected animals for about three months from the time abortion occurs. The most usual form of introducing the disease in a herd is in the purchase of new cows. It is possible, however, to get the disease from the male. It is spread in a herd principally by feed that is contaminated with the infected foetus, fetal envelopes or vaginal discharge. Professor Bang was the first to discover the fact that the disease is spread by the food. The surest way in which it can be transmitted is by intravenous injections. In this way it has been possible to discover important facts in reference to the period of incubation. The time from which virulent material was injected into the blood to the time of abortion has varied from thirty-three, to two hundred and eighty-one days. The average in ten cases was one hundred and twenty-six days. Artificial infection is believed to produce the disease more quickly than where it is contracted under natural condition. An infected animal may abort before she is placed in a herd and still carry the disease to the new herd, or she may be infected at the time of purchase and carry the foetus for several months and then abort, other animals in the herd may then follow in from six to eight months. When the disease is once introduced into a herd it will remain for years unless necessary measures are adopted for its extermination. There is no doubt but that a certain degree of immunity is carried; it is unusual for animals to abort the second time and still more so the third. Where nothing is done to check the disease the old members of the herd cease to abort and it is confined principally to the heifers and will continue in them from year to year.

As a result of abortion, disagreeable complications may occur. Animals that carry their calves to five months or more are frequently afflicted with difficult parturition and assistance is often necessary to deliver the calves. Milk fever seldom occurs after abortion but has been observed in certain cases. Retention of the afterbirth is not unusual and if not properly treated it may result in inflammation of the genital organs and even death of the animal. In some cases inflammation of the udder, or what is commonly known as garget, follows as a result. One of the worst complications in contagious abortion is sterility and many otherwise valuable cows cease to breed. This may be temporary or permanent.

It is possible to prevent or exterminate this disagreeable disease, yet it is necessary to exercise care in doing so that is beyond the ability of the average breeder. One common mistake that is frequently made is to sell animals that abort. This is locking up the stable after the horse is stolen. It is considered better in most cases to keep such animals and take advantage of the immunity that has been produced. In small dairy herds it may not be the best form of economy to spend the money and effort necessary in exterminating the disease. In breeding herds it will prove the ruination of the business if it cannot be checked. One should exercise extreme care in purchasing new animals. It is not advisable to use the same bull on several herds. The animal that aborts should be isolated and kept isolated so long as there is a discharge. This may disappear in a week or may extend for a month or more. Aborting animals should not be bred for about three months in order to give the organisms that produce the disease time to die under normal conditions. The foetus should be disposed of in a way that it cannot spread the infection; it may be covered with fresh burned lime, chloride of lime, buried, boiled or burned, but should not be allowed to remain on the pasture, in the barnyard or any place accessible to cattle, other animals or man. The same is true of the afterbirth. The vaginal discharge is equally as infectious. For this reason it is best to keep the animal confined and not permit her to travel over pasture fields or territory on which susceptible animals are allowed. During the first few days vaginal douches are useful. Various remedies may be used for this purpose. One of the best is a one-half of one per cent. solution of lysol in warm water. It is prepared by adding two tablespoonsful of lysol to five quarts of warm water. This amount should be administered once daily from a vaginal douche or a fountain syringe for about the first week and continued longer if any discharge is observed.

The posterior parts of the cow should be kept clean with a solution of the same strength. The droppings from the animal should be covered twice daily with fresh burned lime, chloride of lime, a saturated solution of bluestone, or some other good disinfectant. The animal is considered fairly safe to be placed with the other animals as soon as the discharge ceases. It is important to be certain that the discharge has stopped permanently.

In a breeding herd where the disease has become established it may be advisable to detect by laboratory examination, if possible, those that are infected, and separate the infected from the non-infected. Practically the only treatment in these cases is to keep the two groups separate and treat any that abort as described above. The heifers should be kept apart from the main herd and a special bull kept for service for them.

It should be remembered that there is no specific medicine that will cure contagious abortion. There are many patent medicines on the market and in many cases their merits have been over-estimated from the fact that natural immunity has been the cause while the medicine received the credit. In certain cases good has been accomplished by the use of advertised treatments for the reason that isolation and sensible advice has accompanied the use of the medicine. Recently considerable attention has been given to the use of medicated methylene blue. This treatment has been tried extensively under the direction of the State Livestock Sanitary Board. Some breeders have reported good results from its use but it is believed that in most cases this is due to a mistaken idea as numerous cases have been observed where equally as good results were obtained with as without this treatment. The carbolic acid treatment has been advocated more extensively than the medicated methylene blue, and some good observers have ascribed some benefit to this remedy when used either subcutaneously or by the mouth. In 1905 the English Board of Agriculture appointed a Commission to make a special study of this disease and among other treatments carbolic acid was given a trial. The report of this Commission shows no benefit derived from the treatment, and this is the concensus of opinion among those best qualified to judge.

The danger of transmitting the disease from the bull is not so great as at one time was believed. yet in exterminating the disease from a herd it is necessary to give consideration to the male as well as to the female. No symptoms are usually observed in the bull yet he is likely to transmit it. It has been decided that clipping the hairs around the prepuce and using the same injections as recommended for the cow is advisable. This should be done especially where bulls are used in more herds than one, or in other herds that are not known to be free from disease.

In considering the subject of infectious abortion, special attention has been given to the disease in cattle for the reason that it is of much more economic importance in this species. It should be remembered that a form of infectious abortion may be found in nearly all species of domestic animals and when this occurs the prevention and treatment recommended for cattle will apply equally as well to others.

The CHAIRMAN: That concludes the program for the afternoon session.

DIRECTOR MARTIN: I trust you will all remain. We desire to have a roll call in order to get a list of those present. We will have the roll call now and then after the roll call we have a very interesting gentleman from New Jersey here. They report there that a great portion of his living comes from asparagus; that he is a great grower of asparagus and he has some samples with him that we will desire to see. After the roll call then Mr. Hulsart will talk for a little while on this subject I have mentioned.

The roll was then called and at this and subsequent roll calls, the following members responded:

COUNTY INSTITUTE MANAGERS

A. I. Weidner, S. S. Blyholder, W. F. Biddle, H. G. McGowan, F. D. Kerrick, B. F. Wambold, W. H. Milliron, L. J. Bearer, Edward Lienhard, M. E. Conard, J. H. Wilson, Joel A. Herr, A. P. Young, W. F. Throop, T. J. Ferguson, E. S. Keiper, Archie Billings, C. A. Randall, Frank Ranck, S. C. George, Matthew Rodgers, Horace Seamans, J. W. Bruckart, Edward Shuey, J. E. Hildebrant, B. F. Kahler, Sylvester Shaffer, E. A. Stuholme, W. C. Black, F. S. Brong, J. Miles Derr, C. S. Messinger, I. A. Eschbach, C. M. Bower, B. F. Killam, A. T. Crittenden, John Schoener, F. F. Glass, Robert W. Lohr, F. A. Davies, G. A. Woodside, Jas. M. Paxton, W. E. Perham, J. Newton Glover, W. A. Crawford, W. F. Holtzer, G. A. Benson and G. F. Barnes.

INSTITUTE LECTURERS

H. M. Anderson, M. S. Bond, J. T. Campbell, Fred W. Card, Prof. Wells, W. Cooke, E. B. Dorsett, F. H. Fassett, S. L. Faust, Sheldon W. Funk, H. M. Gooderham, J. Stuart Groupe, J. A. Herman, John D. Herr, Wm. Horrocks, C. C. Hulsart, Frank Kline, L. W. Lighty, Dr. Hannah McK. Lyons, Prof. T. I. Mairs, M. H. McCallum, Prof. Franklin Menges, Howard Mitman, C. R. Orton, W. M. Patton, E. L. Phillips, Dr. W. T. Phillipy, Chas. A. Row, Robt. S. Seeds, R. S. Smith, W. H. Stout, Vern T. Struble, W. H. Tomhave, Leon Otice Van Noy, D. H. Watts, W. Theo. Wittman, R. J. Weld and E. L. Worthen.

MR. JOEL A. HERR: I want to know what is wrong in the program with Lawrence and Lancaster counties, that they are not recorded on the program and the names of the Institutes workers called out?

DIRECTOR MARTIN: Lancaster county is recognized. Lawrence county, I guess, it was the fault—probably we will blame it on someone not present, the printer. You are aware that after we arranged this program, this bulletin, we were hurried very much, the State printer was exceedingly busy during this winter season and the spring. After we had once proof read this little program we sent it to the printer and by some accident two or three mistakes occurred of the kind mentioned here in the bulletin. We did not take time to correct them. I know I could make an excuse for my own county. We had only one proof read of this and they are doing the legislative work and we are very fortunate to get the program at all.

MR. SHAFFER: It was not missed on the program I have got.

SECRETARY CRITCHFIELD: I think that Lancaster and Lawrence were both called.

MR. WELD: I called Lancaster and called Lawrence.

A Member: Mr. De Witt came as far as Beanville and was taken sick and had to go to bed; I don't know whether he will be here or not.

DIRECTOR MARTIN: I received a letter from Mr. Beck, of Blair, stating that he had contracted a heavy cold preventing his attendance. Now we will be pleased to have Mr. Hulsart make a little exhibit of that asparagus and explain how he raised it.

MR. HULSART: It seems to me the easiest thing in the world for a Jerseyman to get into trouble. Now I thought it would be rather nice to bring out a bunch of our Jersey asparagus and I intended it for friend Martin, though I haven't told him so yet, then he goes to work and springs this on me. Now it is just like—friend Campbell will bear me out in what I am going to say—the early chicken that gets out in the morning and goes and catches a worm and brings it back and somebody else takes it away from him. Some years ago I traveled over the State of New Jersey with friend Campbell in Farmers' Institute work and he was just as enthusiastic when he was in New Jersey as he appears to be this afternoon in Crawford county. But there is one thing he cannot do, he cannot beat New Jersey sand growing asparagus and I think he knows it. You haven't the soil, not that I have seen so far in Crawford county; you know that is the beginning. It is practically impossible, friends, to grow that kind of asparagus on clay land, not that it might not be grown as large, but it will be all sorts of shapes and it will come through the soil turned over and leaning several different ways from Sunday. You must have asparagus soil to grow that kind of asparagus. Furthermore, you must have seed from which to plant. Now, everybody knows that; what I am driving at, is just this, you can't go to a seedsman that is dealing in seed commercially and get seed that will grow uniform asparagus.

A Member: Or anything else.

MR. HULSART: Right you are. Now I'm going to give you two or three examples. The first bed of asparagus that I ever grew in my life I applied to an acquaintance for some asparagus seed from his plantation. The answer that I received was that if he had any left when he was done planting, he would be glad to supply me. Now, I was naturally in a little hurry and I could not wait on that fellow, and so I went to the largest seed house in the City of New York and bought five pounds of asparagus seed and brought them home and planted them in the nursery bed and I grew the plants for a year. Then I set the plants in two acres and a half of land and manured it as well as I could afford to, put on commercial fertilizer and attended to it three or four years, lost about seven hundred dollars and then plowed it up and had everything you ever heard tell of from the old asparagus shoots along the seashore to everything you ever heard tell of, except what I bought and paid for, I didn't have a single bit left of true Palmetto. The seed that produced that bunch came from the man I spoke of, the following year; that was cut yesterday forenoon from a bed now starting on its sixteenth year. I did not bring that bunch to advertise anything before this audience at all. I wanted to show a few friends what asparagus will do along the southern shore of Raritan Bay when it becomes 15 or 16 years of age.

The question has been asked, "How long will a bed last?" Nobody knows; some, ten or twelve or fourteen years, and other beds twenty or twenty-five years; it depends largely on the soil and the man who is farming. If the subsoil is porous for four or five feet, an asparagus bed will last much longer than if it has a clay bottom two or two and a half feet from the surface. An asparagus plant has a tendency to come up, and once it gets near the surface, it is almost impossible to get the shoots of size and get them of length. In planting the plants in the field, we plant them in a trench as deep as a two-horse turning plough will turn the furrow going once in each direction, turn it and come back in the same row and plant the plants in the bottom of the furrow. Men have asked me, "Shall we put in manure?" I know men who advocate it and who have had success in doing it, but there is a reason for not doing it. In many instances the asparagus will do fairly well, provided that manure compost is put on the top of plants, but in many instances field mice get under there and dearly love to chew the little roots and we have a ragged plantation.

Never put manure underneath an asparagus plant when you are going to plant it; the plant will start better, grow faster and be a larger plant at the end of one season, if planted on a hard, solid bottom. Some of our scientific writers, some of those who I suppose never set an asparagus row as long as this hall in their lives, advocate making a little mound of earth with the roots, so that they will spread out in a cup shape. Suppose a man has four or five acres to set; how long will it take to plant them that way? Many things work out splendidly on paper, but when the sun is shining on your back and you get out at six o'clock in the morning and stay until six at night, bent double, that mound question will soon be foregotten. I have been there till my back ached and I set them right on the bottom of the furrow and with no manure. Plant your asparagus, plow it, put on manure and the more the better, all your pocket will stand, if it's twenty-five tons to the acre. I have a bed of asparagus seven or eight years old and there's just a trifle over three acres in it, and I put on forty loads of New York stable manure before I ever plowed it at all. First, I grew them all summer and then plowed them with a two-horse plow away from each side of the row and put a ton of manure to each row in November and then plowed the soil back.

A Member: How much manure do you call a load?

MR. HULSART: 2,200 or 2,300 pounds, practically a ton to the row, is what we put on. It has had two or three applications of manure between that time and now. After we get a certain amount of vegetable matter in the soil, we can grow good crops with commercial fertilizer.

A Member: How is manure out of a mushroom house?

MR. HULSART: In connection with commercial fertilizer, it will be ideal. All you get is the humus making material from that manure; the plant food can be supplied much more cheaply in fertilizers. Now remember this, when we come to feeding an asparagus bed, first we have got a row of plants that takes one year, that is grown in a nursery row, now we have got one writer, W. F. Massey, of Salisbury, Md., who is continually advocating planting the seed where it is to remain, he saves a year. Granted, but if he was to plant four or five acres and then try to keep the bugs off of those young plants and keep the weeds out, I think he would prefer planting them in the nursery row where he would have them in a small space not larger than one side of this hall. When a young asparagus plant comes through the ground and the asparagus beetle is as thick as we have them in old asparagus sections, two or three or four light on that plant in three hours and it is doomed. What man or what body of men on any one farm can cover three or four acres of land and watch it close enough? We plant them in a nursery row and plant them close by home and turn the poultry loose and you will never have to put on any poison, the poultry will take care of it; then take the plants one year old and you will have the best bed at the end of two or three years. Set them in the field after plowing under 10 to 12 tons per acre of manure and set the plants right in the bottom of the furrow, and as soon as those plants begin to grow, put on an application of four or five hundred pounds of good potato fertilizer.

A Member: How deep do you set them?

MR. HULSART: About 8 inches from the natural level. I have had friends tell me a foot, but they measured from the top of the furrow. I use a No. 20 Oliver chilled plow. If the soil was 11 or 12 inches deep, I would say, "Go down ten inches, if you can, but never go more than half an inch, if possible, into the subsoil, or the young plants will not thrive." They will not thrive until the roots get up into a soil that has soluble and available plant food in it. We want to keep the root system down as far as we can. Every new set of roots comes out on top of the old ones. Now, when they become about $\frac{3}{8}$, sometimes $\frac{1}{2}$ an inch thick, then that crown is that much nearer the surface; next year another layer comes up on the top. If we have got the greatest amount of feeding surface close to the surface of the soil, those roots will work out where the feed is rather than go down. If we have got the greatest amount of plant food available down there, 7 or 8 inches, that root system is going to stay down there and you can plow over it and not do a great of damage.

A Member: How old do you let your asparagus become before you begin cutting?

MR. HULSART: I cut it when it is one year old for about 4 cuttings. I set it this April and cut it next season about 4 times or possibly 5; if it has been well cared for and well fed, it is better cut 4 or 5 times than if you didn't cut it at all; it helps to develop the crown.

A Member: How do you control your weeds through the season?

MR. HULSART: By hoeing and cultivation, either the gang cultivator, the one horse cultivator or the hand hoe, and sometimes cutting by hand.

A Member: What do you mean by cutting 4 times?

MR. HULSART: Four different cuttings. For instance, we will cut the first cutting on Monday; when there comes another crop of shoots up, it might be Wednesday or Thursday of the same week, or two or three days later, about 4 or 5 cuttings; the warmer the weather is the faster they come, the less cuttings you want to cut because you want to get more in each cutting, you don't want to rob it, just enough to develop that crown, make it uniform, more buds. Now that coat of manure plowed under there will stand by that asparagus longer than any other application that is put on it.

A Member: Whereabout do you cut the shoots off?

MR. HULSART: Oh, just above the crown and sometimes you cannot always do that, it is down there in the dark; you take your chisel-bladed knife, some use a square one. I have seen growers that use the concave knife. I use a fish-tail knife and the point is notched, ground on one side. I like that for this reason, because in shoving it into the ground, the corner just hits a shoot, draws the knife to the spear and the spear to the knife, and its got to cut off. Now asparagus—right there on that knife question, lest I forget—asparagus never wants to be planted on land that has got stone in it. Any man that tries to cut asparagus half a day on land with stone in it, he wants to leave his religion in church before he comes away because you can't keep a knife sharp and the spears come through crooked. Weeds in asparagus do not harm a knife to get it, but you cannot grow asparagus—from 10 to 25 spears will make a bunch of that size—with weeds on the land. Asparagus is a hungry crop, taking anywhere from 8 to 10 loads of manure to the acre and half a ton of fertilizer and from 200 to 300 pounds of nitrate of soda. Now if we are going to furnish that amount of fertility, and let weeds take out the greater part of it, take out the moisture that the plant needs, the next year the fellow that grew his asparagus separate from weeds, will cut more bunches, larger grass, and the larger the grass, the cleaner the grass, the better looking it is, not only the more bunches he will gather, but the larger price he will receive. I don't know of anything where the appearance amounts to as much in price on the market, as we have to sell ours. In New York City, asparagus is selling from $2 to $3.50 a dozen and the fancier it is, the higher the price. The freight is as much on low priced asparagus as on the medium or high-priced, the only thing that is any higher is the commission. It pays to grow grass as good as we can and as large as we can. We often hear tell of 2,000 bunches of asparagus to the acre. You have heard tell of 100 bushels or more of corn to the acre, but Pennsylvania doesn't average hardly 40 and there is very few men that cut 2,000 bunches of asparagus to the acre; my average is 1,500 on 5 or 6 acres and I find that my neighbors are not cutting any more. Some seasons it cuts more than others. Now I seemed to have created a little thought here and that is one of the objects of a man on the platform. I don't suppose there is a commercial asparagus grower in this audience. If there is, I made a wrong guess, but I said I have created thought, and if you will ask any questions along any line of asparagus growing, if I am able, I will try to answer them.

A Member: How many different kinds of asparagus are there?

MR. HULSART: Palmetto and the Argenquil are the only two kinds that I grow, but there are numbers of others.

A Member: Does bleached grass bring more on the New York market than green grass?

MR. HULSART: No.

A Member: What is your object in ridging it so high?

MR. HULSART: To have length to the spear without injuring the crown.

A Member: We find in our own growing that the blanched grass does not sell as well as the green grass.

MR. HULSART: But you get more of it. In order to get them green, they have got to stand a day or two longer to get green; it all comes from bleaching it all one color.

MR. ROW: Won't is push through air sooner than through that extra amount of dirt? You said you wanted it white and we want it green.

MR. HULSART: No, but you have got to let it stand longer before you can cut it, and if you are an asparagus grower, Mr. Row, you know this, when an asparagus crown sends up 4 or 5 shoots, it does not send up any more until you cut them. If we cut ours to-day, we start a new crop. If you don't cut yours until to-morrow, you don't start a new crop until to-morrow, and the closer and oftener you cut it, the faster you start the new ones, and furthermore, it takes more shoots to make a bunch of green grass than of white. It is like putting a piece of hot iron through a rolling mill, the shoot gets smaller every inch it makes up after it comes out into daylight. I'd like to grow green grass, but I am in an asparagus section where you can look in any direction and see 3 or 4 or 5 acres of asparagus and anywhere from 30,000,000 to 40,000,000 bugs at certain times of the year, and these bugs will soon spoil the grass and that's what sells the grass, the tops.

A Member: How do you combat them?

MR. HULSART: I don't know. The only thing you can do is to keep them cut, you cannot use poison on that; humanity is going to eat it.

SECRETARY CRITCHFIELD: Can't you use tobacco? Humanity uses tobacco.

MR. HULSART: Yes, and so do the bugs, and they laugh at you, they won't turn out for any such little foolish dodge as that. It takes Paris green, and takes it strong. Our experiment station says, "Use 3 pounds of arsenate of lead to 50 gallons of water." Within 200 yards of where I am farming, I can cite an asparagus bed set two or three years ago and that farmer went there with his Paris green and arsenate of lead base, 3 pounds to 50 gallons of water, and the bugs only got fat, and then he put in 5 pounds and killed a few and then he got mad and put in 15 pounds and killed the bugs and didn't hurt the asparagus either.

SECRETARY CRITCHFIELD: Did he try the arsenate on himself?

MR. HULSART: No, that was a young bed, he was not cutting asparagus there. In a young bed, you must keep the bugs off. The making of an asparagus bed is in the first two years of its life, and if you let the bugs or weeds, through neglect of any kind, get possession of it any time during that two years, that bed will never be what it ought to be. I have a bed at home at the present time where one little corner got damaged by bugs and it never cut as well as the rest of the bed.

MR. J. ALDUS HERR: There is quite a good deal of asparagus sold in the Lancaster market and most of it is not bunched. The bunches are not as long as the one Mr. Hulsart has on the table. What proportion of that bunch you have there is edible? Is the lower part of it tough?

MR. HULSART: The lower part, Mr. Herr, has a skin on the outside. When that is taken off, the inside is just as good as the other. The housewife who is paying to-day $.30 to $.35 for a bunch of grass like that, will take the trouble, if she is a frugal woman, to peel that and use all of it. When it is cheap, they will break it like snap-beans until it begins to string and throw the rest away. We have enough crooked and broken—that all we use is about that much of it, but if we had to pay $.30 or $.35 a bunch for it it will say as the mule said to Bill, "It will be used a little lower down."

MR. J. ALDUS HERR: In the Lancaster market, they object very much to asparagus that you cannot pinch and it is fairly tender. They will buy the smaller and shorter bunch.

MR. HULSART: Well, in the New York market, the longer the bunch, the more money it will bring.

A Member: The education of either the Lancaster or New York people, I don't know which one, because as Mr. Herr says, the asparagus that is that tough kind on the outside, while I admit it is better, they simply won't buy it.

MR. HULSART: He says they prefer to buy the shorter bunch. That's easy. That bunch is one that we bunch for the New York market. If I were taking it to Pittsburgh, where they didn't want this part, I would shove the string up there and cut it two inches shorter. Then with us, we wouldn't have to bunch any short grass at all, it would be all one length. We have another grade there. You cut them a little shorter and they will have to be bunched by themselves.

MR. J. ALDUS HERR: Is that cut under-ground any at all?

MR. HULSART: Oh yes, that is cut under-ground all the way from here, 4 or 4½ inches. We use a chisel-bladed knife that length, illustrating, it is not all blade that length; it is on to a ⅜ inch iron rod; the blade is about 4½ inches long; that shoves right down into the ground. Are there any other questions?

A Member: What would be the best asparagus to plant for home garden use? Palmetto?

MR. HULSART: I like Argenquil fairly well, but would just as soon have this and a little rather, for home use. You will not gather quite as large spears, neither will you gather quite so many of them. Personally, the best flavored asparagus is not the largest stalks. I'd rather have the medium sized stalks for my own consumption.

A Member: Did I understand you to say that it is advisable to plow a furrow away from each side of a row and put manure in that furrow? Is that in a mature bed?

MR. HULSART: No, in a young bed. If that is done, it wants to be done at the close of the first growing season after the plants have been put down into the row. In a mature bed, I want it right down the centre, midway between the two rows. I know farmers that manure right on top of the row, but the feeding is not there at all.

A Member: Could you renew a bed that has been neglected in the way of feeding and might be 10 or 12 years old? Could you renew that by an application of manure?

MR. HULSART: If the crowns are not too near the top. If it is only a garden plot, I would say yes, but if it is for commercial purposes, you have got to cut the grass so near the level of the surface of the land, that I am afraid you would have trouble even though that is green grass. The knife is thrust under the ground a little way and as soon as the crown gets up level with the surface when the knife is thrust in, you are all the time pricking the crown with that knife and damaging the buds. These that you damage a little start to grow and come up and you grow crooked, deformed spears and all that is waste. I'd rather have the manure down the centre of the row as deep as you can put it and if it goes right in between the rows, it doesn't make much difference. I want the greater part of my soluble fertility put on after the cutting season is over. No amount of manuring early in the spring will do that cutting any good. You are manuring for next year's crop. You cannot form plant food that will build cellular tissue until you have got a green top, and as long as you are cutting the shoots every day, you have no green top. The greater part of the manuring should be after the cutting season ceases, and you store up fertility for the next season; at the same time, that plant is making eyes to send up shoots for next season's crop. We quit cutting between the 1st and 4th of July, always try to get cleaned up so we can shoot fire-crackers on the Fourth.

A member: What does the producer get for those 1,500 bunches to the acre?

MR. HULSART: Ask the hard questions of the other fellow, don't you put them at me. If we are getting $3.00 a dozen or $2.50, it would be easy figuring, but one day or two days we may be receiving $3.50 and the next week the weather changes, it comes hot enough to make you stroke your brow and down will come the price to $1.75 or $2.00. If you will tell me what the price is going to be until the 1st of July, I can answer the question fairly well. Unless you can tell me that, I cannot answer the question. We start somewhere around $3.25 to $3.75 and sometimes take as low as $1.50 and then comes a little cold spell like last week and up it will go to $2.50 or $2.75, sometimes $3.00. The average good acre of asparagus through our section runs somewhere around $200 an acre. I know some men who claim to get $250 an acre; I don't want to set anybody crazy thinking they are going to get rich growing asparagus because I happen to come here, and if they meet me somewhere else after they have made a failure of it, have them hit me back of the neck because they made a failure of it.

A Member: Where can they buy pure Palmetto seed?

MR. HULSART: Of some grower; never go to a seed-store.

A Member: Do you know who is the grower?

MR. HULSART: Oh, there are several; I am one myself, but I am not here to advertise asparagus seed. We go into an asparagus section, go where we know there is a good bed; that's where I got that seed from.

A Member: Do you have seed for sale?

MR. HULSART: Most of the time, yes. I am no seed grower, but from the very question that you just asked—now at Farmers' Institute work, I came to the conclusion some five or six years ago, wouldn't it be wise to gather a little good seed and have it on hand when that question was asked, and I suppose I have been asked that very question fifty times before and that is the reason I did it, but I make no business of growing seed.

A Member: After you quit cutting and the top grows up probably 3 feet high, when do you cut that off?

MR. HULSART: I don't cut that off until about time spring is opening, and the frost is leaving the ground. In my section, we don't have much snow and sometimes when we do have snow, it is all over along the fence. I'd rather have it in the field and if we leave the tops on, it doesn't drift. About the time the frost is going, I have men go up and down the ground with a sharp hoe. It doesn't take very long. Remember, the asparagus plant grows seed on one plant and fertility on another plant. There's male and female plants in asparagus and the plant that does not produce seed is always the best crop producer. When the man comes forward that can pick out the male plants from the females and set our beds from that kind, we will be able to produce a greater yield of asparagus. If you are going to set them out and wait until they seed and go back and set them into permanent beds, you will lose more than you will gain. I know one man that claims he can tell a great many of them. How near he is doing it, I don't know. In his own field, he does it by the shape of the bed when they are one year old. How near a success he is making, I don't know. I don't claim to be able to tell them at all. If I could, I wouldn't set anything but the male plants, they are the best crop producers. Friends, I thank you for your attention. Mr. Martin, will you take that home with you?

A Member: Mr. Hulsart, what do you think about hibernating insects in the tops standing over?

MR. HULSART: The asparagus beetle hibernates under shelter of any kind. If they have asparagus beds in the open where there are no fence rows, wood or collection of trash, the bugs will go to a distance to hibernate. If you have got leaves the trash, etc., they will get under there. I have known instances where men put things around the asparagus field for them to go under and when they get them gathered together in their winter quarters, then they destroy them. The only way the farmer can get clear of the great crops of asparagus bugs, is to follow up the late brood and poison them, but men are so busy at that time of the year that it is practically impossible. They come in seasons. One crop of bugs will come and they will lay their eggs and finally will disappear. They hatch, grow to be adults, and they will be on hand for a week or ten days and then they will disappear. Towards fall another crop comes and they grow up and hibernate in the leaves and trash around the edge of the field, and if the tops are heavy enough to get under there, they will do it, but very few of them because the tops do not fall down until windy, cold weather or snow comes and the bugs are all in winter quarters before that time; but if the farmer could do thorough spraying in the latter part of the season, we would do away with a large part of the bugs.

A Member: Is it good to have straw around the entire bed for hibernating purposes and then burn it?

MR. HULSART: That would want to be done along about the forepart of November, not much sooner than that, when you are sure everything is hid away under there. That will destroy them. I have known that to be done where there was trash and leaves around the row, burn them off and you will destroy thousands of them that way.

A Member: I have three rows about 50 yards each and so far I have not seen a bug on them. I suppose I will get them there sometime.

MR. HULSART: I wouldn't be surprised. All of this insect question comes where a certain crop is grown in quantity all over a neighborhood. Where there is only a little, there is not much inducement for the bugs unless they are nearby, you don't find it. A few years ago I set three-quarters of an acre of goose-berries and I know people that were bothered to death with currant worms. I never saw one in my field and it is the only piece of gooseberries anywhere in the neighborhood, but let a dozen men plant gooseberries and everybody will have currant worms. A little small piece of asparagus is not going to be bothered while it is isolated from the general cropping sections.

MR. BOND: I just want one minute to give my sincere indorsement to the manner in which that address was given. A man who achieves anything for the Farmers' Institute in the future, has got to adopt his manner, he has got to give us the exceptions as well as the rule. We have been given the rule long enough, laid down as a fast rule, but it is the exceptions we want to know something about.

The CHAIRMAN: We have our friend, Robert S. Seeds with us; we are going to call on him for a short time. We have a few minutes left before adjournment.

MR. SEEDS: Mr. Chairman, Ladies and Gentlemen; I want to say to Brother Campbell that I want to thank him from the bottom of my heart for the welcome he has given us coming into this county. I have traveled with him and know him well, and know his county, and I assure you, my dear friends, that the longer I live and the older I get, the more delighted I am to come and mingle with my fellow-men. God help the man who knows it all, and lives by himself; he is to be pitied. And when a man labors and makes some money, instead of laying it up to ruin some boy or some girl, he should get something out of life and become broader and greater and a better citizen for his community and the state in which he lives. Not long ago, my friend Hubbard, who went down on the Lusitania, was lecturing to the bankers of Pennsylvania at Bedford Springs, and said: "Gentlemen, not long ago I visited an insane asylum where the people were crazy. I noticed that a single keeper had a dozen men out walking and giving them exercise, and I went to that keeper and I said to him 'Do you realize the danger that you are in? Suppose these twelve men should get together, they'd hammer the life out of you and run off.' 'Why,' he said, 'you don't know the danger you are in from these twelve men if they would get together: 'Yes,' the keeper said, 'but they can't get together.'

God help the people who can't get together. A friend of mine was going from one town to another down south and he and his friend were being hauled in a spring wagon with a mule, and a colored man was doing the driving. He noticed in going along that the old colored man would take his whip and pick a bee off of a leaf, would pick a worm off of a stalk or stem; he was an expert with his whip, and after while he came along to a hornet's nest hanging on a limb and they said, "See, if you can bring that down with a crack of your whip," and the nigger said, "No sir, Boss, dey'se organized."

Now that's what it is to be organized, and nobody has watched this more closely than I have within the last twenty years, and right now I notice in this program that the first topic on this question this afternoon is "Community Breeding"—is that correct or "Community Building?" Well, you could get that community building, and right now, from one end to the other of this great and glorious country of ours, at the Chautauquas, at public meetings of this kind, men are breaking their necks to write an essay or a speech and commit it to memory, starting out to build communities, and I want to tell you, my dear friends, the man who takes the platform to talk the building of a community, I want him to begin using the personal pronoun "I" and stick to it until he is through. There is no place under God's Heaven where a man should begin community building more than right in his own neighborhood, that is the place to begin; let him begin at home. I tell you I am from Missouri, I want you to show me. I want to look at it, and I know they will tell you—they can't tell you, you can't do it. The business men of Pittsburgh, backed up by the Chamber of Commerce, 122 men, visited twenty some towns last week. This evening one week ago, in Altoona, I was invited up to talk at their reception, and in that speech I happened to say, speaking to them of what they were doing. I said I was the first man in Pennsylvania to raise alfalfa that I know of and there wasn't anything that I said to the business men of Pittsburgh that they applauded like they did when I stood up before them and boasted of being the first man to raise alfalfa in Pennsylvania. I say this to show how broad those men are in Pittsburgh. I know the church members at Birmingham, Pa., stood at the Birmingham Church and said, "You can't do it," when I talked about raising alfalfa some years ago. They said, "You can't do it." The scientific men told me not to talk it, that it wouldn't do in Pennsylvania. They said, "You can't do it," just like a man in St. Paul. He was out one evening and met some friends and he got so drunk he could scarcely get home, and he started and on his way home he had to go through the movie district of St. Paul, and going along the pavement, he staggered up to an electric light pole and got hold of it and looked up and saw an electric sign that said, "Home, Sweet Home in three reels," and he said, "You can't do it." Like the poor fellow who went to the hospital, and the operation was performed and he was on the operating table, had come to. and a fire broke out across the street and the Doctor said, "Pull down the blinds, this fellow will come to and think the operation was a failure." Making communities, making them better, that's what we want to do, and not long ago, my friend Lighty took supper at my home which was the greatest pleasure I have had for sometime, but after supper, walking out over our farm which has almost been ruined the second time by a lumber job—we were walking over a mowing field that had the manure on the top of it and he looked at the manure and looked at the elevation we were on and he said: "Seeds, it is mighty expensive to haul this barnyard manure up a hill like this." I said, "It is all right, we can haul it up this hill and put it on a mowing field and not plow it down and beat the man who plows it down," and I haven't seen a mowing field in this great and glorious country—

MR. CAMPBELL: You haven't been to our place.

MR. SEEDS: I say to you that I haven't seen a grass field from Pittsburgh to this town this morning that looked as good as that mowing field that has the manure on top of it. That will be mowed and the top taken off and be a better field for corn next year than it was this year before the manure was put on it. Did you hear what this man said about this asparagus, about putting the manure on a year before to get the crop the coming year? Every now and then I come across a man who is turning around and backing up the things I am talking about. Of course, they don't like it. I have been called more liars than any man in the State of Pennsylvania. I like to pose as the biggest liar in the State because I stand in a class by myself. I know they find fault and say they don't like it. I have had it thrown in my teeth dozens of times. A man down in Pittsburgh not long ago, was working for Jones & Laughlin and a friend met him and said, "Are you still at Jones & Laughlin?" "Nor sir." "I thought you liked them, couldn't work any place else." He said, "I like Jones & Laughlin all right, I have been there a long time, but I didn't like the way the boss talked, and so I quit." "What did the boss say?" "Why, the boss said, 'you're fired.'" So my dear friends, the great thing in any line is the ability to come together, and I will tell you that—you can talk about stories and applications, but my friend Peachey told a story that not as long as I live, could I forget it if I wanted to and that is to back up the assertion that I am from Missouri and I want to see it, I want you to show me; that's the question; you can talk about theory, you can talk about how it will look and all that kind of business, but I want to see it, I want to look at it with my eye and Peachey told a story that I will never forget, of the old lady going across the ocean on a ship and she heard them talk about crossing the equator and she went to the Captain and said, "Captain, I hear you are going to cross the equator. I would like to see the equator." The captain said, "All right, you shall see it; and the day we cross it, I will take you out on the deck and adjust the telescope and you can take a look at the equator." And in a day or two, he said, "Come out on the deck and I will show you the equator" and he adjusted the telescope for her to look through and pulled a hair out of her head and stretched it across in front of the telescope and said, "Do you see that line in front of you?" "Yes, I can see that plainly." And the captain said, "That's the equator" and the old lady said, "I see it plainly, and I see a camel crossing at this time." So I want to tell you, my dear friends, that the man who starts out—I wrote an article for the platform of Chautauqua not long ago and in that article I made the statement that the man who steps on a Chautauqua platform—I know they have been saving us poor country people for years and years and years, but the man who steps on a platform to tell the people how to build a community, I want to tell you, if I am in the audience, I am going to ask him what he has done to build any community in this country. I want to look at it; I want to see it and I want to see it with my eyes.

Right on my own farm where Mr. Lighty was the other day, you can talk about looking at alfalfa all you want to, how it will look and all that, but I like to go out and see it with my eye; I like to see it being cut with the scythe on the 1st of May and put on the wagon and hauled into the barn and see the pigs and the bull and the cattle eat it. I like to look at it; I like to see it with my eye. That is the part that cuts the ice; and I have seen it time and again, and you know what I would do if I had the power? I would go to Harrisburg and go before the legislature and I would say, "Gentlemen, I want so much money to pay the taxes on some farm in the centre of every county; we will pay the taxes on that farm and give it to any young man or any old man that will come out on it, give it to him for nothing and all we ask him is to take the farm and say 'Here, come and look at it and I will show you how to do it.'" I want to see things and I want to look at it, and that's where the particular part of it comes in.

It is nearly four o'clock and I didn't intend to make a speech, and haven't made a speech; I have simply talked to you, but I want to tell you, my dear friends, that as I travel from one end of this country to the other, my heart is getting into this work more and more every year, and getting into the practical part of it, and as I travel over the country I see wherein we can make the communities better if we unite and go hand in hand and shoulder to shoulder. We can make this country better every year, by building and making the communities better.

A Member: I would like to ask one question: We have all been trying this unity for some time, and it wouldn't unite. Now for a little experience of ours: About twenty-one years ago we built the silo: it was no credit to us, we were forced to build the silo. We waked up one spring and found the worms had eaten the grass roots up and picked the sward off like an old sheepskin, and we built a silo and I think I can point out half a dozen or more men who said once in a while, "You made me build a silo." I told them they would have to have a silo and after while they got it.

MR. SEEDS: That's good, that's all right, that's the way to do it. I know I do things every now and then and it is not long until a whole lot of other people do the same thing. I painted my house one time and painted the wall a stone color, white lead with lamp black put into it, you can color it to suit yourself, and we do things because we see other people do them and that is what makes the community and that is the way we learn from one another, and that is the way we do the practical part of it.

DIRECTOR MARTIN: Now, my friends, I want to call your attention to the evening program. The meeting will be called to order at 7.30 promptly. The subjects are very important as you will see by referring to the program. I know you will all be interested and will ask you to be here promptly at 7:30.

The Institute then adjourned until 7:30 P. M.

TUESDAY EVENING, 7:30

Mr. William C. Black, Chairman.

The CHAIRMAN: The house will please come to order. The first subject on the program this evening is "Agriculture and the Public Schools," by Prof. L. H. Dennis, Expert Assistant in Agricultural Education, Department of Public Instruction, Harrisburg, Pa.

The address of Prof. Dennis is as follows:

AGRICULTURE AND THE PUBLIC SCHOOLS

PROF. L. H. DENNIS, *Expert Assistant in Agricultural Education, Department of Public Instruction, Harrisburg, Pa.*

Mr. Chairman, Ladies and Gentlemen: On a recent trip throughout the Middle Western states—I say recent, it was about a year and a half or two years ago—it was my pleasure to go through the Ford Automobile factory, located at Detroit. Visitors have access to nearly all parts of that great and wonderful factory. The most interesting thing that one notices is the system that prevades every shop. We were told, as we were taken through the various departments, that it is possible for the manager of that great factory to find out at any time of the day, the exact status of every department in the entire factory; the system is so complete. The thing that interested me the most, however, was the fact that they have in their various departments, specialists whose business it is to carry on a searching examination and investigation every hour of the day and every day of the week for the purpose of ascertaining if the best processes are in use there at the present time. They carry on this examination to see if it might be possible to substitute some other materials in place of the materials they are now using, and to see if it might not be possible to put the materials that are in use through some different process in order to arrive at the same result with less work, with increased efficiency, and, of course, with greater profit, which is the end.

On that same trip, it was also my privilege to go through, what is probably the most modern flour mill in the United States; if not in the world. It is not the largest flour mill in the United States, it is one of the largest, but not the largest, but it is the most modern. Again, the thing that interested me most there, outside of the direct management of the mill, was the fact that these people have found that it pays them in dollars and cents to hire a specialist whose business it is every working day of the week to examine into the processes used in that mill. He carries out physical and chemical tests daily of the flour that is turned out there, what they call blended flour. It doesn't have quite the same meaning as when we use that term. The man who holds that position was for years an agricultural chemist. This large milling concern has found that it pays them in dollars and cents as I stated a few minutes ago, to hire that man at a good-sized salary for the purpose of examining into the methods that they employ in that big mill, and the thought occurred to me as it has occurred to me many times since, that if these various lines of industry—and they are only small phases, you might say, of industry—could afford to hire specialists whose business it is to carry on a daily examination of that business, a daily critical self-examination, you might call it, because these men are employed by the business itself—if it pays them in dollars and cents to hire such men, it seems to me that the great business of farming can afford to carry on the same critical, self-examination.

In a group of people of this nature—it is not necessary for me to say anything about the importance of farming—we all know that every living person in this country depends upon the man who produces the food and the clothing for all of us—it is not necessary for me to emphasize that point whatever, but I do believe that it is worth while to say in passing, that this business is big enough, is fundamental enough, is of sufficient importance to all of the people of the United States as well as to the men themselves who are engaged in this business, to carry on a daily, critical self-examination of the business, and the only reason I make that comment is that here and there we still find someone who thinks they know all there is to be known about the business of farming just because we have had handed down to us customs and traditions from the past. I say the business of farming is big enough and complex enough to make it pay us in dollars and cents to carry on this same critical self-examination that has resulted in such great profit to the automobile industry. I could mention a hundred and one illustrations; I could point to the development of transportation which has been the result of critical, daily and hourly investigation into the methods that were in use for the purpose of finding better methods, finding better materials, for the purpose of bringing about increased efficiency, and the business of farming can stand, yea, it needs that same critical self-examination.

Now the agricultural leaders of half a century ago, yes of a hundred years ago, realized there was need of this critical examination. George Washington pointed out in his time that it was necessary for us to make a study of the soil. Benjamin Franklin pointed out the fact that you could produce more on an acre of ground that was properly cared for, fertilized, than you could on an acre that was not, so what we know about fertilizers is not altogether of recent origin. Thomas Jefferson pointed out the fact that many improvements could be made upon the plow. Some of his suggestions were taken up by practical men and put into operation, resulting in some definite improvements to the plow. The first agricultural society in this country was organized in Philadelphia in 1776, I think it was, and Benjamin Franklin and George Washington were both members of that agricultural society. Half a century ago, the agricultural leaders—and they were more numerous by that time, realized full well that there was a great need for more definite information about the scientific facts underlying the common farm practices with which everyone who lived on a farm in the open country was more or less familiar. What was the result? We had established land grant colleges whose purpose it was to get, to secure some agricultural facts. Later we had the experiment stations. Later on, we had our national department of agriculture and the various state departments of agriculture. The point I want to make is this, the great problem half a century ago, was the problem of securing reliable information of a scientific nature concerning the process of farming.

Now the great problem before the agricultural leaders of today is not one of securing this agricultural information, although there are still many, many things that we do not know about farming, much as we do know, much as we have inherited from the past, there are still many facts yet to be learned and you and I will be dead and gone before some of the very simple facts—they may prove to be—will be common knowledge among the people of this State. But even though there is much to be learned, the great problem of today is not one of securing this information. The problem that the agricultural leader of today faces is this, it is the problem of taking that information which is available to the people who are on the job, if you will excuse the slang, carrying it from the various sources to the people who are doing the work and further than that, putting that information into operation.

It is one thing to get this information; it is another thing to take this information to the people who want it, and another thing to get that information put into operation; and the great task facing us today is this task of carrying this information to the people who want it. That is why we have federal aid for this work; that is why our National Department of Agriculture is carrying on all these demonstrations throughout the United States. That is why the State Department of Agriculture with its very efficient corps of instructors, is busily engaged in this very proposition because that is the job of the agricultural leaders of today. And right here in passing, I want to pay a tribute to the man who stands at the head of our State Department of Agriculture for the past few years and who has been developing that department of agriculture into a very efficient department. I say, long may this Department live and may its efficiency be further increased, and I also want to pay a tribute to the men who are engaged in this very business which I think, and I am not alone in this, is the business of the agricultural leaders of today, that is the business of taking the information from the various sources—and there is no one source—from the various sources, to the people who live in the open country and are endeavoring to put this information into practical operation, and you men who are members of this Department of Agriculture, engaged in this work, ought to take renewed faith in this cause in which you are working.

In passing, I merely want to say that I believe you are all engaged in what is today the big agricultural problems. There are problems that are to be solved right on the farm, that is true, but it has been pointed out to us time and again, that there is already enough information which, if put into operation, would save us millions of dollars every day. Our state colleges, experiment stations, the National Department of Agriculture, all these agencies have now a vast amount of available information, but the problem is to get it to the people who want it, and after you get it there, to get it into practical operation.

We are hearing a good bit these days about the problems of the country, and some people would have us think that the country has gone to the dogs, that the country church is practically no good, that the country schools are of practically no value, that the country home is no good, that the woman on the farm is a beast of burden, and nothing more, because some people have been carried away in their enthusiasm to extremes. Dont forget for one minute—and I know you won't because you men know the situation because of your vast experience—don't forget for one moment that the city has more problems than the man on the farm has ever had, and I want to say right here that I believe those who have anything to do with the working out of the problems connected with life in the open country are coming a little bit nearer to a realization of those problems than the people in the cities who have been wrestling with the city problems for the last half a century. They will always have their problems in the city, but they are over-shadowed sometimes, by the newer problems that come up. The only reason we are hearing about the problems of the country today is because this is newer to some people; the problems are not new by any means, but they are new to some people and get more space in the newspapers, but the same problems, the same disagreeable problems, some of them are, in the city, are still before the people of the city and I am not going to point out what they are, but let me mention one or two.

The question of housing, the question of good streets, the question of a sufficient and pure supply of water, the question of sewage, the question of the prevention and control of fires—right along that line you may know that Ex-chief Croker of New York City, who for years was head of the fire-fighting system, discovered there that in spite of the fact that they were spending more and more money in the city of New York every year for improved fire apparatus for increased efficiency in their fire-fighting department, that in spite of that fact, they were fighting a losing fight in the City of New York, that fires were increasing, that property damage as a result of fire was greater every year until Chief Croker came to the conclusion that they were not attacking the problem in the right manner and resigned as chief of the Fire Department of New York City and went into the fire prevention work, attacking the same problem from a different view. There is a problem that the city will always have, and there are a good many others. And I want you to consider the vice prevalent in the city; and they have their problems while the people in the country are having theirs, but I do believe that those who have anything to do with helping to solve some of the problems that are peculiar to life in the open country, are coming just a little bit nearer a better solution than some of the people who are engaged in attempting to solve the problems of the city. Perhaps it is hardly necessary in an audience of this nature to call attention to that fact at all.

I must confine myself, owing to the fact that there are several speakers on the program, to the particular subject assigned to me, yet what I have said has a bearing on what I say. The great problem of today, let me repeat, is this problem of getting this information from the various sources into the hands of the people and may I say here, that the work is so great that there is work for all hands to do. No one man, no one agency, no one group of men, can do all of this work. The work is so great that there is work enough for all to do. My great hope is, and the thing that I endeavor to help as much as I can in my weak way is this; I believe when all the forces that are engaged in this proposition that we are discussing here to-night, or when all the forces now in existence or which may come into existence that are engaged in this proposition of carrying this message, this information from the various sources to the people, are working hand in hand and in close co-operation, the work is going to be done more efficiently than now, is going to be done more rapidly and with greater success ,not only as far as the work is concerned, but as far as the co-operating agencies are concerned. I believe, my friends, that that is one of the great problems facing Pennsylvania today and I trust we will be able to see our way clear for every force to increase its efficiency without losing its identity, and I think a close co-operation will help to bring that about.

Now where does the public school figure in this agricultural development? I want to say here, in passing, that I do not believe that it is the function of the public school to participate in industrial movements for the improvement of agricultural conditions unless it can do it very largely through the rising generation, because there is its business. The business of the public school is to give the boy and girl, that comes into that school, the type of training that that boy and that girl ought to have. It is a question as to whether we have been giving the most efficient form of education. I say it is a question. I hardly think it is a question at the present time. I think we have come to the conclusion that our present system of education must be modified, not eradicated, not thrown away, but modified to some extent so that with the training of the head, we may give some practical training of the hand. I believe that every boy has a right to expect, when he enters the doors of the school room, that when he comes out of that school room, at the end of a term of years, he shall be better able to earn his daily bread and butter as a result of the education that he receives there in that school. The education that he receives should be an education *for* work instead of an education *away* from work. I sincerely pity the boy that grows up without any opportunity to work, without any chance to work. It has always been my conviction that every boy, regardless of where his home is or what he expects to do in the future, would be much better off if he could spend one to three years on a farm. Every city boy would be better off from the standpoint of his physical condition, his mental condition, stamina, and growth of all kinds and his outlook on life, if he could take three years of his life and go right out in the country and live on a farm, not board on a farm, not be a guest, not be a student on that farm, but be one of the young men who live there and work there and play there. I believe that every boy would be better off. I have been thankful many and many a time that it was my privilege as a boy to live on a farm, and get that very experience which I would not exchange for many dollars, regardless of the work I am in. Every lawyer would be a better lawyer, I believe, and every doctor would be a better doctor, if, during his boyhood days, he could live through some such experience as that.

Now, coming down to the direct question of the discussion of agricultural schools, as I shall have to jump into that now rather rapidly—there are in the United States to-day, three types of secondary schools of agriculture. In discussing agricultural education now, I shall say nothing about the agricultural colleges or higher agricultural education. There are three types of agricultural schools in this country, all doing about the same kind of work, dealing with the same type of boy.

In the first place, there is the congressional district agricultural school which, as its name signifies, is a congressional district school, that is to say, there is one school of this kind or type to each congressional district in the State. The schools of Georgia are examples of this type of education. It has been my pleasure to visit every one of this type in the United States, having visited every state east of the Mississippi, except three or four, for the purpose of visiting these schools and trying to get some measure of their efficiency. The congressional district school must, of necessity, inasmuch as it is intended to serve the entire congressional district, must have a rather large equipment, it must have dormitories to take care of the boys and girls who come from considerable distances. I have found in all the congressional district schools I have visited, that a large percentage of the boys and girls enrolled in that school come from the county in which the school is located; most of them even come from that section of the county in which the school is located. I found one school down in the State of Georgia that was located way up in a corner of the congressional district and about 65% of the students came from that county, most of them coming from the upper half of that county. There were one or two counties that had few or no representatives in that school at all. The school attempted to serve the whole congressional district. The school had a school farm and rather a large school plant.

The next type is the county agricultural school which is very similar to the congressional district school, in fact, I have found in some states, county agricultural schools that had a larger plant than some of the congressional district schools. They did not serve as large an area or as many students, in some cases, but had more money behind them to produce the schools. These county schools attempt to serve the whole county, but even in these county schools, it is necessary for boys and girls to come to school and board or board in town. That is true in Wisconsin where they have a number of these schools and it is true in Maryland where they have a few. It is necessary in such cases to have a school farm.

The third type is the agricultural department in an existing high school. It is the smallest type of the three; it is the type which is the nearest to the people of the three; it has the smallest equipment and takes the least amount of money to start it; but by the way, you cannot measure the efficiency of a school by the amount of money you put into it at all, though it is sometimes true, that if you put little or no money into a thing, you get few or no returns. You cannot expect in education, or anything else, to get something for nothing.

The advantage of this agricultural department in an existing high school, the advantages, I should say, are chiefly these: In the first place, the school is right at home; the boy and the girl can come into school every morning and go back home every night, and it is my firm conviction that boys and girls of a high school age, should be at home every night during the high school period. They are needed at home, the mothers are in need of the girls of that age, and the fathers, the farmers, need the boys of that age, because they are a very great help mornings and nights, Saturdays and holidays, during the summer. And, furthermore, they need their homes very much at that period of life.

Now the agricultural department or agricultural high school, if you wish to call it so—this school is located so near the homes of these boys that it is not necessary to purchase and operate any school farm.

The main objection to having a school farm is this: That that school farm is very apt to be run under conditions that are not natural; they have to do certain things in order to fit the school conditions and the experience that the boy gets on a school farm does not always compare favorably with the experience that he would get on his own home farm, and the home project work which every boy carries on who is a member of the agricultural class in these agricultural high schools, the home project which he carries on can be carried on on his own home farm under the supervision of his father as well as of the teacher of agriculture of that school, and the school is so located, inasmuch as it serves a rather limited area, that the teacher of agriculture can get to the boy's home and supervise that project. I will tell you more about that later, when I throw these slides on the screen.

I think those advantages are advantages that are worth considering. I admit that this type of school is under a very close scrutiny and must stand a more severe test than your larger county school or your congressional district school. If you want to get a lot of advertising, create your special school serving a county or several counties, build several attractive buildings, buy a school farm, put up large buildings with dormitories and then take your pictures, as some of our Western states have done—the Western states know how to advertise and find that it pays to advertise in more lines than just in business—some of those states have credit for operating types of education that have been in operation in Pennsylvania and New York for the same period of time that they have been in operation in those Western states, yet the people of Pennsylvania and New York know nothing abont it because we have not learned how to advertise. I believe that a certain amount of advertising in school work and church work and other lines is legitimate and even necessary. We can learn a great many lessons from California and other states that can produce apples, not as good as the apples grown in Pennsylvania, yet by their methods of growing and marketing and advertising, can send their product clear over to Philadelphia and New York and educate the public to want their apples in preference to those grown in Pennsylvania and New York. It has been my experience to find that the dealers in fruit there, particularly the retail dealers, will try to impress on you the fact that they are selling Western apples, not New York State apples, and not Pennsylvania State apples. They must have learned that the public is looking for Western apples, and it is because of the way those people advertise.

I believe it is about time that we Pennsylvanians took hold and boosted Pennsylvania. About the only thing we have been hearing about Pennsylvania is the graft of the State Capitol, and I am sick and tired of it. I have heard time and time again when visitors would come into that Capitol, the very first thing they would say to the guides who so efficiently serve them, "This is the building on which there was so much graft." They never see the beauty of the building at all. I say it is about time we took some pride in that magnificient Capitol, the best in the United States. I say it is about time we begin to boost Pennsylvania, in other ways, that we be boosters, not knockers in Pennsylvania, and I believe it is a part of my business because of the work I am in, and your business because of the work you are in, to help on this movement of boosting Pennsylvania. It will take a period of years to get the people of the State generally to boosting everything in the State. You may think it is an easy matter, but isn't it time we quit knocking each other? Isn't it time we started in to boost each other? It is not characteristic of Pennsylvania as of those Western states, particularly the Pacific Coast states, for everybody to take hold and boost everything in the state. You talk to anybody that lives in California, and in five minutes you will be convinced that the thing you ought to do is sell out and go to California. We have a good bit more reason for talking that way about Pennsylvania than they have about California, because if the truth were known about all sections of California, you might not want to go out there and live. There are some nice spots in California, but the state, as a whole, does not compare to Pennsylvania, and it is about time we did something. Pennsylvania has decided, as have New York and Massachusetts, Indiana and the State of Michigan, and the great State of Minnesota, which has thousands of dollars to put into education of this kind, that the most efficient form of secondary agricultural education is agricultural education of the high school type, that type which is typified by the high school department of agriculture or the agricultural high school in the agricultural community. It makes less of a showing, it takes longer to prove itself, but it is nearer to the people and it must stand the test.

One illustration: A boy carries on a home process, he carries on that on his own home farm. His father sees every day what that boy does, sees the methods that boy employs, learns what the supervisor of agriculture tells that boy when he comes to talk with him about that project. If there is any value in that project whatever from an educational or productive agricultural standpoint, that boy's father gets it also. If there is no value in it, that boy's father soon sees it and the whole business no longer receives that man's support. If that boy went to a county or congressional district agricultural school, he could carry on his work on that school farm and nobody would know what it was. It isn't under such close scrutiny, it doesn't have to stand the test. But let me re-iterate that the chief function of the public school, or agricultural high school in this development, is to give the boy or girl that comes into that school, the type of education, that he or she ought to have in the improvement of agricultural conditions. Some of it will come as a result of the instructions given in this school, but primarily, it is to give the boy or girl the type of education he should have, and I think that school should give him some information about the business he is engaged in and which he probably will follow when he gets through with this school work.

This agricultural school work started in Pennsylvania two years ago with the passage of the Vocational Education Act. Five schools were started; this year we have twelve schools in operation in twelve different counties, and next year there will be many more in other counties. As I said a little bit ago, I believe it is time we all pitched in and co-operated with each other. My theory is this: That these agricultural high schools ought to be local centres for the various agencies that are carrying on their very efficient work, and I want to say right here, that all of these agricultural high schools stand ready to assist and co-operate in any and all of these movements for the improvement of agricultural conditions in the State of Pennsylvania. The agricultural high school movement is only one, is a small phase, not to minimize the work they are doing, at all, but it is only one phase of this great movement for better agricultural conditions in the State. It has its peculiar work to do, but we do believe while it is doing this work, it can work hand in hand with those who have some other phases of the work to do.

Now, without further comment, I want to throw on the screen a few slides showing some typical scenes in a few of our agricultural schools. You will notice as these pictures are thrown upon the screen, that the scenes, as they are presented, do not represent the ordinary school room. The atmosphere of the ordinary school room is not present in our agricultural school. The work is practical. Allow me to say here also, however, that in our enthusiasm, we do not allow ourselves to forget, as I stated twice this evening, that the chief business of this school is to give an education to the boy and the girl that comes to this school. Training for citizenship is not lost sight of, and half of the boy's time is spent in the study of practical subjects. The other half is spent in the study of academic subjects because the boy on the farm will always have as much need of English, and the same English training, by the way, as the boy who enters the factory or the shop or the bank or the store. This particular school happens to be located in a court house, there being no available space in the school house. But this is a high school located in one of the northern tier of counties of the State. There happened to be no room in this building for the agricultural department. The next building with the white columns, had a very large basement which was utilized for this purpose, a series of rooms being fitted up for the agricultural department. This, it happens, was not the slide supposed to be in that particular place. It happens to be a picture of the prize winners in the bread and cake contest in one of the high schools in the northern part of the State. It goes without saying that the study of soils is an important part of the work in these agricultural schools. The work of these schools consists partly of recitation work in the agricultural class room, or the laboratory, as it is called, consists of experiments in the laboratory and consists of field trips. The previous pictures showed a class in agriculture under the direction of the supervisor of agriculture, sampling soils in the various fields surrounding the school. As a rule, most of the boys in these agricultural schools, ask the supervisor of agriculture to come to their home farms for the purpose of examining the soils on their farms. In many cases, soil maps of the farms are made.

This is a class in a small, but very up-to-date and progressive agricultural high school or agricultural department in a high school in Lancaster county. Even Lancaster county, with all its knowledge of agricultural conditions, with all its agricultural wealth, has found that it pays to take up this form of education. Here is a picture of that same school in Lancaster county. Two boys have been carrying on some experiments with soils and are making their weight measurements. Poultry raising is usually taught in the first year of the course, although a fixed course, or suggestive course has been offered for the agricultural schools of the State, yet the agricultural course is flexible enough to meet conditions in all sections of the State. Here is a class in one of the southwestern counties of the State, engaged in killing and dressing chickens for the market. That particular type of work is usually preceded by a study of it and the study of the various methods of killing and preparing chickens for the market. That is followed by a demonstration on the part of the teachers and the students themselves.

Here they are using the French killing knife and dry-picking the chickens. This is a poultry exhibit at Waterford, in Erie county. It was a small high school and a small department when it started out, but proved to be one of the most successful in the State. The boys made all the coops in which the fowls were exhibited with the exception of one. This is a study of corn, another crop which is very important. The boys are taught how to select a good ear of corn. They are also taught the various ways of carrying on the germination test. This represents a teacher of agriculture with his two boys, looking over the results of a germination test, and there they have used what is known as the rag-doll tester. You are all familiar with that. I shall not go into details at all. The slides show those of you who are engaged in the agricultural work of the State merely some idea of the methods employed in these schools for carrying on this work. This is a corn and potato exhibit. These were the prize winners in Jefferson county last fall. Each one of these boys won a free trip for their work in raising these potatoes and corn. This class is out hunting for borers. As I told you a few minutes ago, the work is partly done in the class room and some of it is done in the agricultural laboratory and much of it is done out in the field. The work is usually so arranged that the class spends half a day under the supervision of the agricultural instructor so that it is necessary in the best interests of this work for that class to go right out into the wood-lot for the purpose of studying forestry. The class can do so and it is not necessary for them to get back in thirty minutes or thirty-five minutes for an algebra or Latin lesson. Their academic work comes in the morning.

Every boy ought to be taught how to take care of tools and how to handle tools. This is taken care of in our agricultural schools. This is a view in one of the schools started the first year in what was a worn-out, run-down, private academy, taken over as a vocational agricultural high school and started this year with an enrollment of between 60 and 70 students the first year. This very efficient and practical shop was made out of the basement by putting in more windows and concreting the floor. These are some of the things the boys make in the shop. I believe in manual training, the manual training that has been in operation in some of our schools during the past ten years has not fulfilled expectations. That is partly because of the type of work done there. It is true the boys are taught how to handle tools and how to take care of the tools, but some of the things which they make, and some of the things they do in order to learn, those processes are not in themselves practical. It is my theory that a boy can make something practical while he is learning to handle a saw or hammer or chisel. This work beneath there, that step-ladder, wheel-barrow and those crates, were made by boys the first year in the agricultural department.

This shows boys in one of our agricultural schools making a blue-print frame. They wanted to make a hot-bed, and they first drew their plans, then made a blue-print frame, then their blue-prints, then they started in the shop and prepared their lumber. They even made the sash, something which is not usually done, and glazed it. Of course, probably from a commercial standpoint, it does not pay to teach boys to make sash in the shop because carpenters as a rule, do not make their own sash; however, every boy ought to know how to do glazing. These boys later built the hot-bed. Most of those boys are Freshmen in that agricultural school. These boys are here learning something about shop work, about the handling of tools and are also engaged in the work of the poultry class. They are building this brooder house, partly on the time of the shop work, and partly during the time of the poultry class. Of course, all this work is preceded by the study of proper methods of housing the chickens.

That is a familiar sight to all of you. Of course, the use of the Babcock Milk Test—that is only one phase of the work in dairying done in these schools. I want to impress on you that it does not require any elaborate equipment to do this work successfully, because much of it must be done out of doors and right on the farm. However, I do not believe that any efficient system of education can be carried on by starting out every day to go and see what you can find, going out and hunting some cattle, and after you get there, judging the cattle. It must be preceded by some effort to organize your information and instruction.

This speaks for itself—it is a Wayne county scene, Bryson Springs, which must be preceded by some theoretical work. I am making no effort whatever to describe what is on the slides, because you can see at a glance. As I stated some time during the course of my talk, each boy who takes this agricultural course, which is a four years' course in the high school, must carry on some agricultural project. I shall show you here, slides illustrating two projects. Mr. Rockwell, the supervisor of agriculture in the agricultural department of the Mansfield High School,—one of our most progressive and successful agricultural departments in the state,—will probably tell you about several as he has several different types of agricultural projects in operation in his agricultural department at the present time. This boy is preparing the ground for an acre of corn. He has taken as his agricultural project the raising of an acre of corn. What particular project the boy takes, depends upon his home conditions and it is an individual matter in every case. This boy decided that he would raise 1,500 tomato plants and he did that. He raised them and canned and marketed them. He bought himself two canning outfits before the season was over and he canned beans as well as the tomatoes. On the 15th of last June—and the reason I have the date is that every boy who carries on an agricultural project must keep a daily record of what he does in connection with that project, in order to have some record of the methods employed, and expense and labor and everything, everyone must keep this daily record—this boy kept his daily record and that is the reason I happen to know that it was on the 15th of June of last year when we had a frost and he covered 500 of his 1,500 tomato plants and the others he went out early in the morning and wet them in order to save them. He put his tomatoes on the market and the brand was known as the Waterford brand.

Now while we are providing practical education for the boys, we are also giving some attention to practical education for the girls, and there is a side of our education which we have not as yet developed very much. I am not going into that phase of it. That subject has probably been discussed by those of your own staff who are giving this matter serious and constant attention. While we know something about a balanced ration for a chicken and a hog and a steer and a cow, as yet we know very little about a balanced ration for a man or a woman or a boy or a girl, and it is infinitely more important that we know something about a balanced ration for ourselves than for the hog or the hen, and I believe that our education will be so modified that every girl will receive some instruction along this line. A reasonable amount of dressmaking, plain sewing first, some little fancy sewing in case some individual may desire it, but the real, every-day, practical sewing. Some mothers can and have, many mothers can and have taught their girls practical sewing, but there are still other things those same girls might learn under the direction of a capable seamstress. These are some things made by some Freshmen girls in the home-making department in one of our agricultural high schools. I believe that in the making of those things and in paying attention to the cost of the materials used, the girl has received as much culture as in a lesson in algebra and as much mental training. Basketry is taught in some of our agricultural high schools.

There are many things that can be introduced in these schools. Now if the process of carrying bricks from the ground up a ladder on to the scaffold of a building in the process of erection, after being scrutinized carefully, could be so revised that man's efficiency could be increased from 25% to 50%, it is barely probable that the simple processes of laundering, washing and ironing, might perhaps, with profit, stand some inspection. It is barely possible that some of the methods that our girls are familiar with, might be modified to some extent after study. In any case, here is one thing we accomplish with all this work, regardless of whether any methods are changed or not, and some will be probably; here is a thing that is done and it is a thing that is necessary. Home-making is made popular with the girls, and do you know, my friends, I think it is about time that an effort is being made to make it more popular? It is all right for girls to study algebra, geometry, Latin, Greek and all those subjects, but if it is going to lead those girls away from home rather than toward the home, it seems to me that it is about time we give them some of this training with that other training.

Now I want to draw one distinction, that is this, and the reason I am going into details with you, ladies and gentlemen, is this: I feel that in the work you are in, you have a right to know exactly the methods we are following in the establishment and maintenance of these schools. Some of you have co-operated in the work of these schools already; meetings have been held in these schools; I want to draw this distinction for your information; sometimes a department of agriculture or of home-making, either or both, is established in connection with an existing high school, the school continuing as a high school with those vocational departments. Sometimes a special vocational school is started, which merely means that there must be in that school these two vocational courses. You may have a high school that has one vocational course, the agricultural, or one, the home-making. If you start a school that has both, you have what is known as a vocational school, what could be called, in truth, a vocational agricultural school; and I believe that is the type of school that is coming into the open country, because in that school, the subjects are properly balanced with relation to each other, the academic studies receiving the proper amount of attention and not too much.

This is a picture of an old academy that was on its last legs, just about dead, taken over as a vocational school and started this year for the first time as a vocational school with an enrollment of between 60 and 70 pupils. In that school were placed a faculty of 5 teachers, principal, academic teacher, and one teacher who devotes part of her time to the teaching of English and part to the teaching of drawing and music. The salary list of this school which is right in the country, a mile and a half from any railroad, runs about $3,600 of which the state pays $2,400. I claim that the country is just as much entitled to the services of qualified teachers, and experienced teachers, as the towns and cities are. And I claim that it is about time that the state put as much money into instruction in the rural districts as it does into the districts in the cities, and I also feel that not only the question of efficient teachers, but I believe it is about time that we let the cities and towns experiment with new teachers and we took the experienced teachers in the country. I think we are entitled to that. Three of these five teachers are college graduates, and the other two are graduates of normal schools. There is no reason why we should not have a school of this kind in every section of the State. That school is operated by four districts that went together for that purpose and I believe in many cases the township is not the ideal unit to operate a school of that type. Three or four districts in the country should go together to operate a consolidated vocational or high school. Furthermore, there should be some special inducement on the part of the State for the formation and maintenance of such a school.

This was the agricultural laboratory in that school. Here are the girls in the Freshman class. Notice the fact that the girls of this school are more mature than the Freshmen of the average city schools. It means that better work is being done and more sensible work, you might say. One thing that the boys in the country—one opportunity that comes to them with the creation of a school of this type, among many others, is the opportunity for a chance to play with each other. These schools usually have their athletic teams of various types. This school had a basket-ball team, a baseball team, and a football team. I think it is a thing that ought not to be overlooked. I haven't time to go into that phase of it now. One other side to the work of this school—I believe the school, while its chief function is the serving of the boys and girls who come there, ought to have one other, which ought to be of some service to the entire community, it ought to have on file all the bulletins of the State Department of Agriculture, the United States Department of Agriculture, and our agricultural colleges and experiment stations, so that if any farmer wants to come and secure the use of these for one day or three days, he has a place to go and get them without any trouble or expense.

Night schools can be operated for all classes of people in the district. You notice the little girl in the front seat—she is there because her mother who sits immediately behind her had no one with whom to leave her and had to bring her with her. When she entered this school, she didn't have the ability to make a dress for the little girl. When she finished the course that winter in this evening school, she had made several dresses for the girl. Of course, that condition of a mother not knowing how to do plain sewing for a child, is not typical of the country districts. This is a picture of a farmers' night school. This is one other way in which these agricultural schools serve the people of the community. The farmers of the community are invited to come in once a week, if they care to, for the purpose of conducting what is sometimes called a farmers' night school. This farmers' night school is presided over a part of the time by the supervisor of agriculture, who takes up the topics the farmers themselves desire. On various occasions, various other agricultural leaders, members of the state department of agriculture in the vicinity, come in and conduct the work for an evening, members of the state college staff who happen to be in the vicinity, and prominent farmers take charge, some evenings, men of exceptional ability; in one or two instances, I have known the veterinarians of the district to come in and give instruction at these sessions.

Now what are we going to accomplish as far as the promoting or improvement of agricultural conditions is concerned? Is it going to be possible for us to grow sweet potatoes like that as a result of agricultural education in our public schools? Notice the size of those sweet potatoes. I have been growing sweet potatoes on a small scale for the last two years, but I don't guarantee that those particular sweet potatoes were grown in my garden, nor that those strawberries came from my garden. We are going to do some big things according to some city enthusiast. Everybody takes hold of this great agricultural up-lift, as some of these city people like to call it. I suppose some of those persons think we really will be able to raise strawberries something like that and maybe cabbages of that size, but I will tell you what we will do through the work of these agricultural high schools, we will give boys of this type and this age, the kind of education they ought to have, and the kind of education, my friends, that they are entitled to, and that I believe it is our business to give them. Mr. Rockwell, who is to follow me, will give some details of the work of his own school. I have not gone into detail very much in connection with some of these things because of the fact that he will follow me. I thank you very much for your attention.

The CHAIRMAN: It is not on the printed program, but announced by the Director of Institutes this afternoon, Mr. Rockwell, the Supervisor of Agriculture in the Mansfield High School of Tioga county, will address you on the practical side of education.

ADDRESS OF PROF. ROCKWELL

Mr. Chairman, and Members of the Normal Institute: Will you pardon me at the outset if I should happen to use the pronoun "I" a few times in order to explain my position here? This morning when I first consented to be sandwiched in here this evening, I understood I was to talk to an audience of teachers; but I see in the foreground a body of note-worthy men—ladies and gentlemen—the greater part of whom are experienced lecturers and speakers, and it certainly is an embarrassing position for a man who never before has had any experience in public speaking. A little fellow came on the stage and with a trembling voice he uttered a little piece which was so appropriate to the occasion that I never can forget it. He said:

"Speaking pieces, speaking pieces,
What's the use, I'd like to know;
Getting up before so many,
When it scares a fellow so?"

This is my first appearance as a public speaker. I hope I do not make as big a blunder as when I first appeared before the Board of Examiners of the Normal School. Mr. Casey was conducting the examination in reading and asked for some definitions, and finally asked for someone to recite some poetry and make some proper gestures. The only possible thing I could think of, was "The Village Blacksmith." I rose and started and began like this:

"Under a spreading chestnut tree,
The village smithy stands;
The smith a mighty man is he
With large and sinewy hands."

Then unconsciously I said this:

"And the bristles on his brawny arms,
Strong as iron bands."

Knowing perhaps, Casey's humorous side of life, and how he enjoyed a joke on the other fellow, you can judge whether I passed in reading or not.

I will have to tell a story on a gentleman from his locality. He purchased a new span of mules and put them to drawing potatoes. He had loaded up a wagon and had to draw them up a hill to get them to the house, and he started along and was becoming so infatuated admiring his new span, that he had not noticed that the end board had fallen out and the potatoes had all rattled out. He got half way up the hill and his long-eared friends refused to go any further. He looked around and saw that the potatoes were all gone and a very disgusted expression came over his countenance as he uttered the words, "By Golly, stuck and nothing to unload." I can assure you that that is exactly the position of the speaker at this time. The good member of the Board who asked me to talk this evening, told me he didn't want me to say very much and I am sure he could not have picked a man who was more sure to fulfill those qualifications than the one he has at the present time.

It is my purpose to discuss with you for a very few minutes, the public school system in respect to its origin and purpose, its good qualities and its short-comings, some partial remedies and what we are doing and have done at Mansfield along the line of practical education. As probably the greater percentage of you know, the public school is not American in its origin, but has come to us from across the water and is principally of Dutch descent. It is about 155 years old. It was grafted on our national life at a time when ideas and conditions were vastly different than to-day. It was promoted with the purpose of universalizing education. The books were few and the colleges were few and were for the few. The college authorities saw this and conceived the idea that if they could import a sort of a free public method of education which would be classical in its tendencies, it would prepare students straight for college and increase the number of their students; so you see the public school system was promulgated with the end to treat every one alike, to achieve this particular purpose and prepare people for the colleges.

I heard Dr. Windship, of Boston, speak on the subject of public schools, etc., and he said that it was a rare occasion when we allowed our cattle to go for many months without giving them some change of feed and yet, he said, we have not changed the feed of our public schools in the last 25 years. This is somewhat far-fetched in its meaning, but, nevertheless, it opens an avenue of thought well worthy of our consideration. In discussing the proposal to build a new $50,000,000 Union Railroad Station in Chicago, a certain editor came out in his paper and said he thought it would be very nice if we knew where our grandchildren wanted that station located. The second editor said that he thought we ought to go very slow with the public school and not have anything in it that our grandfathers would not sanction. I am convinced that we cannot build railroad stations for our grandchildren and schools for our grandfathers.

The State Department, as you have heard to-night, is advancing some new ideas along the line of education, and in every case are willing to back those up, yet there are lots of people who are not willing to accept those ideas just because their grandfathers and grandmothers all the way back to the ape, have always lived under those ideas and always will. Such people are dead from the chin up and oppose all new ideas, and when one comes out in a newspaper, they want it stopped right away, and in nine cases out of ten, they owe for their subscriptions. When such a person dies, the editor has to print it under the head of "News," and is always glad that such a person has finally consented to be buried. This may be an old story to many of you, but it impresses very forcibly the large number of students who drift away from these schools at the age of 14 and 15. The last statistics I found, showed that out of every 100 people starting into the elementary schools, seven get to the high school, and out of every 100 getting to the high school, five get to college.

You will ask what becomes of that vast army that never get to college. They drop out into the so-called dark alleys of the world, become boot-blacks, newsboys, messenger boys, etc. This proves to me very decidedly that our public school system, that our system—of course, our system to-day is an improvement upon the system of the past, but it has not gotten away from it so far yet; it is educating about 10%; the other 90% are going away from school at the age of 15. I think I see a partial remedy to keep some of those people in school and that remedy is this, to give them a little molasses and not feed them sour kraut all the time. What I mean by molasses is inculcate something in the school system which will give the boy and girl an inkling of something they can do or some vocation they can take up in after life. Did you ever stop to ask a boy what he goes to school for? Have any of you ever tried out that proposition, especially with a boy that is 12 or 15 years old? Sometime, if you are ever in a school, you try out that proposition and it will amuse you greatly what the boy goes to school for. He has the idea that he has got to go to school until he is 16, then he is going out to get a job. I have tried out the proposition many times and it is the compulsory side they look at entirely.

The average boy going to school is like Pat and the rabbits. Pat came to this country all filled with curiosity and went down to a railroad station one day and saw a box with a wild rabbit that someone was shipping to a friend. His curiosity got the best of him. He went over to the box, looked at the address, lifted up the cover, reached down in the box, began to fumble around carefully, and all of a sudden out went the rabbit, over the railroad track and Pat after it. When he got on the hill, he saw the rabbit wriggling his tail at him in defiance, and he said, "You rascal, keep on, you don't know where you are going, the address is back there on the box." (Laughter.) The average boy going to school is like the rabbit, he don't know where he is going simply because there is nothing addressed to the life of that boy to make him look forward to some job or some vocation in life. I am talking about the boy, but I see ladies in the audience, and I don't want them to feel slighted. President Taft said that he thought if we taught the girl some trade, that the matrimonial proposition would be practically solved, and to sum it up in brief, he said, "When some weasel-eyed, skin-flint of a good-for-nothing came along and wanted to marry that girl, and she could earn her own living, she wouldn't have to put up with anything like that simply because she is afraid to be an old maid."

To turn to the other side of it, I have in mind two persons, we will call them John and Mary. John earned $18 a week and Mary was the daughter of a good family. Her father was a man who earned a moderate salary, but had provided a good living for her, and in the meantime, Mary had become very extravagant in her ways; and, to make a long story short, John and Mary were married. When John went home to the first meal, Mary had made some biscuit. He sampled the biscuit, concluded he didn't like those biscuit very well, and about that time the cat came along, one of the biscuit fell off the table, hit the cat and that was the end of poor kitty. Next time he came home, he tried to choke down the beefsteak, and had to go to the saloon for something to eat. Things went from bad to worse and sooner or later, the matrimonial bark was wrecked on the rock of Mary's inefficiency. Mary was a high school graduate. She studied her Latin, her Cicero, geometry, algebra, had the whole outfit, but when John came home, he couldn't drink coffee made from the extract of 50 quadratics, we will say. He couldn't eat bread baked in the devil's coffin, he couldn't eat hash made of permutations and commutations of quadratics; he had to have something wholesome to eat. So you see Mary's education did not function when it came to keeping John's house. She had failed in the divine duty that she was supposed to do in life, making a good home. I think the nation depends upon the efficiency of the home to a certain extent. The mother, I am sure, is the largest factor in the American home. She is 90% of the American home. Doesn't it stand to reason that if Mary had not had quite so much geometry and algebra and Cicero and Virgil and all that stuff, and if in addition to that she had had something practical, don't you think it would have been better for Mary? Don't you think it would have been better for John? I think you see the point I want to make.

To illustrate another point, which is my last one, I wish to tell you a story of two sisters I have in mind that were left a farm. These two sisters were both college graduates, one of them was teaching for $1,800 and the other for $2,000 a year. They thought they would run that farm for a while and they went home; they engaged a neighbor to manage the farm by the name of Joseph. My, wasn't Joseph proud to be manager! He worked from morning until night, Sundays, holidays, most all the time, he was so proud to be manager of that farm. The girls after a while thought they would go out and visit the other farms and get some new ideas. They went out and saw that the other people were conducting the Babcock Milk Test. They went home and told Joseph. He did not want to do it but was finally compelled to do it. Later they saw the other people around the country were washing their hands before they milked and they told Joseph they wanted him to wash his hands before milking, and he said that he washed them once a day and that was enough; and sooner or later on account of Joseph's unprogressiveness, he was released from the position. In the meantime, he had married the kitchen girl, and the girls had built the two a nice little cottage and they were indeed very happy. That made it necessary to get another girl from the woods. She came from the back-woods, had never even seen a train of cars. Her language was very poor, her walk was bad, her dress was a fright. She came there. Her stature was somewhat larger than that of the previous girl and she noticed that the girls talked differently from what she did and she began to eliminate from her vocabulary the things they didn't use. She soon surprised the girls by talking so well, after she had saved up enough money she went to the two sisters one day and asked if she could not go to the same dressmaker and milliner they did. They said "yes," so she went down and got a new tailor-made dress and the girls didn't know her at all. She looked so much better than they did that they were ashamed to walk with her on the street, and as Billy Sunday would say, as far as looks were concerned, "She had them trimmed to a frazzle." One day a real estate agent came out and Mary asked the girls if she couldn't go along. They said, "Yes," and she dressed up and got into the front seat, didn't make any bones of it at all, went out to the station where they were to look over the property and Mary became very much infatuated with it when she found it could be bought on the instalment plan and bought some of the real estate. To keep up with the hired girl, the sisters had to buy some, and next day the real estate agent came along and gave Mary a commission for what they had bought. Next day she started out and told them the possibilities there were in buying real estate on the instalment plan and it was not long before she told the girls she couldn't work for them but half a day, she had so much other work in selling real estate. About a month later she came around and told the girls that she couldn't work for them any longer because she had bought an auto, rented an office, and was a real estate agent. In three years Joseph was looking for a job. In three years Mary was a successful real estate agent.

I have a purpose in mind in telling you that story. The high school, or public school, if it is going to educate 90% of the people, or if it is going to give 90% of the people all of the education they will ever get, has some responsibility on its hands. You people are from all parts of Pennsylvania and are a very good representation from the State. No doubt, you are very influential in the places from which you come. Now are you going to be like Mary or are you going to be like Joseph in promoting this new idea, or promoting a school system which, if the boy cannot go to college when he gets through he will have something practical in life to work with? I will leave that for your own judgment. Mr. Dennis has shown you a number of slides. Some of the slides I expected to show you did not arrive so I only have a very few and it won't take me but an instant to show you these. This is a picture of the agricultural class of the Mansfield-Richmond High School. You notice there we have a very good representation. I will tell you how I managed to get such a large class the first year. When I went home from State College last Easter vacation, I went to the high school and gave them a talk on the benefits of a practical education. During the summer-time, I hired an automobile; I visited the whole territory in Richmond and Mansfield borough for students to take up agricultural work and I saw a number of students and talked the proposition over with them, especially the boys who I thought, would not be able to go on to college. The first day of school when the professor called for students who would like to take up the agricultural work, over half the boys in the school stood up and the professor was so surprised, that I could see he did not like it very well.

He is a gentlemen who has never thought very much along vocational lines. It was such a surprise to him; I guess he thought the whole school was going to turn into the agricultural department, so he eliminated a number of those boys who stood up, who, he thought, were too young to take up the work.

I just want to mention in passing, this, that we had a track at Mansfield last Saturday at which Tioga and several other counties were represented, and the Mansfield High School won the events, took 42 points; their nearest competitors about 25. Of those 42 points, about one-half of them were taken by the boys who came in from the farms. This gentleman right here, won the silver medal for getting the most points of anyone in the five schools. He also won a gold medal for scoring the largest number of points of anyone in the high school. This gentleman right here, won the shot, putting it 38 feet and 10 inches. This gentleman here functioned in the broad jump. Another boy got second in the broad jump. Of the basket-ball team, six fellows of the seven belong to the agricultural department; of the baseball team, six of the nine. So it brings to the front, the country boys who are the strongest of all, and are developed along other lines as well as agriculture.

This is a picture of the shops. These boys here are making step-ladders. These hammers were donated by Maydo. He gave them two dozen. We received a dozen saws, some squares, bevel squares and a number of things like that were donations. Here are some of the things that were made in the shop. This was taken early in the year before we had very many made. We have step-ladders, saw-horses, nail boxes, crates, etc. These are taken around town and many are sold. In that way our shop is a sort of self-sustaining institution and we sell these things for just what they cost. This is what I call my over-flow work. There's always boys who get through in the shops before the others do so I bought some lumber myself and had the boys make a little colony house and we made it according to scientific principles and when they would get through their work, I'd let them work on this colony house. This is to take right down and take out-doors. Here is the forge-room. I have in this forge-room, about $125 worth of equipment. It cost the school board about $18 or $20. The Bell people donated one of these forges and the Lancaster Forge Company, the other. The other equipment, anvils, drill press, taps and dies, and many other things—I bid those in from a sale in which the fellow had deserted his family and owed a rent bill and I got about $80 worth of stuff for $15, so you see we got the things for our forge-room at a very reasonable price. The things we make in here are rings, braces, chisels, hammers, horse-shoes, chains, etc., and in that way they get the welding and tempering and when they want something on the farm, they won't have to go to town and spend half a day to get it fixed.

In this project, they are preparing poultry for show, these are the different wash waters and here they are dry-picking a bird. This gentleman here lives at Hornell. He cannot be at Mansfield during the summer to carry on this project, but he is going to go on a big poultry farm there this summer with his uncle, so in order to say he had done some sort of project, I had let him hatch about 500 eggs and he has four machines to attend and he had good success with all but one machine which was a very old one and he is now running another machine in place of that. This is a demonstration of a capon fowls. This year I expect to have the different boys raise on their own farm about 200. This gentleman right here has already 26 capon fowls that weigh about 2½ pounds and he also has another bunch coming on that will be ready to caponize in the course of two weeks. I hope to have 200 marketed at Christmas time. I will market them for the boys, but they will raise them on their own farm.

Before I take up this picture, I will say a world about our work in poultry. About 12 or 14 of the boys are going to have projects in raising poultry. Two of the incubators were donated, one by M. M. Johnson and the other by the Buckeye Company. The boys will raise the chickens there on the farm. If they raise layers like the Leghorns, their problem will be, how much did it cost to raise Leghorns until they come to laying? If it is a meat breed, they will figure how much they make until they market their poultry.

This is a demonstration in pruning. I have three boys doing projects in orchard work. One boy has 57 trees, the other, in the neighborhood of 30. Their project will be to keep track of all the time and all the cost to take care of this orchard. They will make a map of the orchard, the kind of apples that grow on every tree, the number of marketable apples they get off each tree, then we will try to get a market for those apples. That is a project that will take some time during the summer. I have pictures of three boys doing work on the farm. This is another picture showing a demonstration in spraying. This is a picture of the night class. There are always some skeptics in communities when some new things come up. In order to show some of the people what we are doing, and whether it was practical or not, we devised this scheme through the suggestion of Mr. Dennis to have a night class for the farmers. The first thing we took up was the Babcock Milk Testing Machine for testing cream and skimmed milk. Before I pass this picture, this is our soils laboratory. We have polished tables that we use where they sit around when they recite. We have a very elaborate equipment for a school of the kind, and we are doing agronomy which they are doing at State College in the same manner as far as possible, as they are doing it down there. Some of the boys are so old that we can do that work this year and I hope to be able to get the credit for that work.

Another thing we took up in the night school was feed and feeding and plant foods in their chemical state, the lime question, and last of all we organized a milk testing association and we had 50 at the last meeting. Mr. Tompkins, of State College, was there and Mr. Dorsett was present, and had absolutely no trouble in organizing a milk testing association which, I think, is going to prove very successful for the community. I hope I have not imposed upon your patience and I want to close with a thought from Garfield who, I think, paid the greatest tribute to agriculture in the fewest words of any man I know of when he said, that ahead of all sciences, ahead of all arts, ahead of all civilization and progress, stands, not militarism, the science that kills, not commerce, the art which accumulates wealth, but agriculture, the mother of industry, and the maintainer of human life.

The CHAIRMAN: The next topic is "Centralization of Public Schools" by Mr. E. B. Dorsett, Mansfield, Pa.

Mr. Dorsett then read the following paper·

CENTRALIZATION OF PUBLIC SCHOOLS

By E. B. DORSETT, *Mansfield, Pa.*

Whenever a public writer or speaker is at loss for a subject upon which to express his views, he either selects the "Public School" or the "High Cost of Living;" little realizing how closely the two subjects are related. Few, indeed, are the number who have studied the close relation that one bears the other, but have felt that the most serious condition of country life, as we find it to-day, is the silent but startling migration of our rural people to the towns and cities. Country people are moving in to secure better school advantages for their children, which they are unable to get in many of our public schools. This reduces the number of producers and increases the number of consumers, thereby raising the cost of living. This pernicious practice is not only draining our farm homes of their brightest boys and girls, but is removing from the farms men and women in the prime of life, who are most needed to maintain a rural citizenship.

The type of citizenship in any community should be of such a character as will instill in the minds of its people a desire to build up and maintain better social and educational facilities. There can be little incentive to do this if these facilities are to be found only in our towns and cities. The fundamental problem of country life is that of keeping a standard people upon our farms, and in making life on the farm more attractive and remunerative. This can only be done by providing efficient schools, such as will meet the needs and supply the wants of our boys and girls. Years ago the rural school was the center of attraction. Singing schools, spelling schools and literary societies made it the life of the neighborhood. The school system then fitted the needs of the rural people. To-day, owing to industrial and educational changes, the old public school of the past has gone never to return again. We must have a redirected school system and it must be directed in part, at least, by those whom it is to serve. All mankind, and especially the farmers, should be deeply concerned in this readjustment of the rural school.

THE FARMERS' VIEWPOINT

The administration of our schools and the burden of raising the taxes, rests largely upon the tillers of the soil. It is my purpose then to give you the farmers' viewpoint of the farmers' school. The making of the courses of study, the manner in which they shall be imparted to our children, the framing of the laws governing our schools, is almost invariably turned over to the professional educator, or politician, who, however excellent may be their motives, have limitations the same as the rest of us, and see only one side of the question, and that is the professional one.

Extending back to the days of Horace Mann, the father of our educational system, our schools have been built upon the beautiful theory that every American child shall have a college education.

This sounds well from the platform, reads well from the printed page, but never has and never will work out in actual practice. Building upon this theory, we have correlated our educational system. We began at the top instead of the bottom of the ladder. Between the Public School and the College, there is a broad and deep chasm; so high and so wide, that only about five per centum of our boys and girls ever cross it. We owe much to the pedagog of old New England for the impractical and inefficient school system under which we have been working for a half a century. It is time that the farmers should have something to say about who shall teach and what shall be taught their boys and girls.

CENTRALIZATION OR CONSOLIDATION

In an Act of 1901, the word "Centralization' is defined as follows: "That for the purpose of this Act, the word 'Centralization' is hereby defined as a system of schools in a township providing for the abolishment of all sub-districts and the conveyance of pupils to one or more central schools."

When the Pennsylvania School Code was enacted in 1911, all the previous legislation referring to consolidation, transportation and centralization was repealed and in its place the following sections referring to the subject of consolidation were enacted.

"The Board of School Directors of any school district in this Commonwealth may, on account of the small number of pupils in attendance, or the condition of the then existing school building, or for the purpose of better gradation and classification, or for economical or other reasons, may close and consolidate any one or more of the public schools in its district, and, upon such school or schools being closed, the pupils who belong to the same shall be assigned to other schools: Provided, That in any district of the fourth class, pupils who belong to any such closed school, and reside one and one-half miles or more from the school to which they are assigned, shall be furnished proper transportation at the expense of the district, to and from the school to which they are assigned."

It would thus seem that under the School Code, "Consolidation" rather than "Centralization" is the term to be used.

EDUCATION DEFINED

"Education is a reconstruction of our experiences." This is a short, concise yet comprehensive definition. Much of the subject matter that is taught in our public schools to-day has no relationship whatever with the experiences of the boys and girls on the farm. Hence, much of the teaching is meaningless and worthless to them. Culture is the object sought in obtaining an education. Not so many years ago it was quite generally believed that this could only be obtained by studying dead languages and higher mathematics. To-day we know that culture can be obtained just as readily by studying the things which are practical as in studying those which are not. The question of how and where they shall get their culture of training, is of but little moment, so long as they get it.

RURAL CHILDREN NEGLECTED

The most pressing problem of the public school and especially the rural school, is the problem of giving every child in rural communities a good common school education. To do this, it becomes necessary to first get them into our schools and then hold them there long enough to secure the necessary training. As the burden of maintaining our public schools rests most heavily upon the farmer, and as his children are the ones most directly benefited, it is time that he took a more active interest in perfecting a practical and intelligent school system. To provide every child of school age in his community with a good school and to keep that school in operation eight or nine months out of the year, requires a vast expenditure of money, as good schools cannot be had without some sacrifice. The rural school of to-day, as compared with that of a generation ago, is much less efficient in the training of our boys and girls. Then these schools were attended by large numbers of boys and girls who remained in them until they were full grown men and women. They were taught by the brightest minds in the community, often, during the winter, by college students and during the summer by women from the Normal school or academy.

THE SCHOOL OF TODAY

The rural school of today is taught, in most cases, by young, inexperienced, half-trained and often inefficient teachers, who lack in professional ideals and ambitions. They may be divided into three general classes: The raw apprentice class who expect to teach until a better position is offered them in the town or city; the marriageable class who teach until they get married, and the old stagers who are too inefficient to get positions elsewhere. Again, many of the teachers are from the town or city and are not in sympathy with farm life and know nothing of the real needs of the children. When Friday night comes they go back to their homes and do not return until Monday morning. Such a teacher can be of but little use in the school room and should never be elected to a position in a rural school.

SCHOOLS TOO SMALL

The attendance in many of our rural schools is so small that the teacher cannot do good work. Thus it has come about that many of our schools have too few pupils to stimulate the teacher to do his best work or to give the pupils that very important part of his education which comes from contact with his fellows. This condition is greatly aggravated when there are not pupils enough in the class for mind to come in contact with mind in the daily recitation or on the playground. While it cannot be claimed that consolidation offers a panacea for all the ills of the rural school, because there are many sections of our State where it would be exceedingly difficult, if not impossible, yet the movement thus far has been very satisfactory and is changing our whole school system. Undoubtedly the work will be extended and will become an important factor in solving the problem of the rural school. It adds another agency for breaking down the barriers of isolation and stagnation which so often have kept the farmer out of harmony with the world in which he lives, and which have caused the farmers' children to leave the country for the greater attractions and greater uncertainties of the city.

CONSOLIDATION MEANS BETTER ORGANIZATION

With consolidation of the rural schools will come very much wider opportunities for the enrichment of the courses of study by the introduction of those subjects which are most directly related to the improvement of agriculture and to the inculcation of a love of country life in the boys and girls on our farms. All around our rural schools lies a wealth of material, which, thus far, has been almost entirely neglected for the lack of knowledge and the absence of the skilled teacher. In the modern consolidated school will be found teachers of experience, well equipped and properly trained to organize the work entrusted to their keeping and correlate theory with practice.

Mankind in general, and teachers in particular, are indebted to science for the knowledge which enables them to point out the real relation which exists between certain facts and phenomena and the daily pursuits of man. In recent years much information has been gained in the study of those things in nature with which the farmer has to deal. The teacher is now able to unlock the secrets of the air, plant, soil and the animal and make them the common property of the child. The teacher, as never before, is now in a position to explain the activities of the natural world and of the advantages that may be taken of these activities. The nature of the soil as related to the crop which will grow in it, the life of the plant as related to the amount of grain, or forage, or fruit it will bear, the body of the animal as related to the food which it requires for maintenance or growth, the life history of injurious insects as related to the means for their repression. These are some of the things which the teacher, through the aid of science, has now to offer the boys and girls who intend to remain on the farm.

BENEFITS DERIVED

Consolidation of schools will have a tendency to unite the farmers who pay the taxes and support the schools, the home makers, the teachers, and the pupils into a co-operative organization for the betterment of rural education. It will instill in the minds of the boys and girls higher ideals of citizenship. The school will become a character builder, and the districts will be rid of those agencies which destroy character, namely, unkept school yards, foul and unsightly outhouses, poorly equipped and illy planned school houses, young, inexperienced and too often inefficient teachers. It will give a broader and more practical school course and in short better equip the boys and girls to fight lifes' battles.

CONSOLIDATION MEANS PROGRESS

It was not so many years ago that one dared to criticise the public school. To do so was considered an act of treason. The little red schoolhouse was both idealized and idolized. It was the backbone of our civilization and an index of progress. In recent years the one-room schoolhouse has become the target, not only of the critic outside of the school, but also of those who are directly associated and most vitally interested in our public school system. Sentiment in rural districts is rapidly crystalizing in favor of consolidation. Instead of conducting a dozen district schools in a more or less efficient manner, with a given number of buildings to heat, equip and keep in repair, the children are carried to one central point where they are given the advantages of a graded, or better still, a high school of first grade.

This method of dealing with the rural school problem is becoming more and more popular where it has been tried out. It marks the beginning of a new school system, one that will be both cultural and practical. It ushers in what will some day be known as the Agricultural Age. It will put the boys and girls in rural districts in touch with an educational system that will be continuous; one that will best fit them for the work they are to take up when they leave school. This is something that has not been in the schools of the past and is not being done in many of the schools of to-day. In fact, there is no correlation between the work that is being done in many a school room and that which is to be done by the boys and girls after they leave the school. With the advent of the consolidated school, all this is changed, and we find the boys and girls actually studying the problems that will confront them when the dreams of youth have passed and life becomes a reality.

CONCLUSION

Betts and Hall's "Better Rural Schools," says: "Great movements and deep-seated reforms never come by chance. They are always produced by adequate causes, by forces that are consciously set in motion and carefully administered. There is still a great amount of social inertia to overcome and of ignorance and selfishness to be removed, before rural education comes fully into its own. Indifference to educational needs and advantages is still the rule in many communities. Prejudice yet obtains in hundreds of districts not only against the consolidation of schools, but against all improvements.

"These conditions must be wisely and courageously met. They cannot be overcome by fine theories nor by the appointment of educational commissions. The passing of wise laws and the adoption of helpful resolutions may be a step in the right direction, but without the winning of the people most concerned all these things will prove futile and fruitless. The reform now being sought in rural education will require hand-to-hand work, and almost a house-to-house canvass, to instruct, inform, convince and convert. A doubter must be persuaded here and a skeptic won over there; a stingy man must be stirred into seeing greater value in his children and their future than in his stocks and his farm; here an obstacle will need to be removed from the way of progress, and again enthusiasm will have to be created and maintained; movements already started must be cherished; projects that advance but slowly must be hastened, steps taken in wrong directions must be checked, and every phase of the situation watched with the greatest wisdom and care."

A Member: Mr. Chairman, I would like to ask Mr. Dorsett a question. Mr. Dorsett, how did you proceed to get your Mansfield schools consolidated?

MR. DORSETT: It was a very simple proposition.

A Member: Our Superintendent is suggesting something of the kind in Northumberland county, and the boys there want me to get some information from you if I can.

MR. DORSETT: In the first place, we had a joint meeting and agreed on what we should do. We had a contract drawn up in such a way that we each pay into the joint fund or to the joint treasurer, as it were, an equal sum each month. At the close of the term, we ascertain how much it has cost us per pupil, then each pays in a pro rata share. Now that is one way you can work it out. Another way is, if your school is established in the town, the township may send the boys and girls there and under the law they are obliged to pay you what it costs per pupil for that instruction. It is not a hard problem; there are many ways by which you can solve it. If you have to erect a new building, you may join jointly in that; you can have a joint board or pay per pupil as you desire.

A Member: Mr. Chairman, may I ask one more question: What is going to prevent the election of young, inexperienced teachers in the consolidated school?

MR. DORSETT: If you have a high school, the law will help you to determine that question, because teachers must have certain training.

A Member: It doesn't now.

MR. DORSETT: It does with us. You will hardly find a young teacher with the qualifications required in a high school.

A Member: Oh, not a high school, but in the grades.

MR. DORSETT: In the lower grades perhaps it would not cure that defect.

The CHAIRMAN: The next subject is "The Country Church; its Relation to Agriculture," by Rev. B. Monroe Posten, Pottstown, Pa.

Dr. Posten then delivered the following address:

THE COUNTRY CHURCH

By REV. B. MONROE POSTEN, *Pottstown, Pa.*

I have been pastor for twenty-two years in the country and am not looking at this problem from a ten-story window in the city. I have purposely worked in a number of sections of both New York State and Pennsylvania. I wanted to find out conditions for myself. I have found some interesting facts, but mighty little help in solving the problem. After I had seen what had been done with some of the timbers raised in my little churches, for instance, the pastor of one of the largest churches outside New York City, the Superintendent of City Missions, one of the leading physicians of Buffalo, pastor of a large church in New Jersey, principal of one of New Jersey's best schools, all were from my churches, I dedicated my life to the country church. I felt if I could only win one such as either of these, my work would not have been in vain.

That the country church is in danger is not a false alarm. It is true. Reports of investigations show fully 65% are dying or are already dead. A great many of these were so situated it were better if they never had been. Sixty per cent. of our great population live in the country, with 6,361,502 farms, valued at forty one million dollars. But it is estimated that in 1950 we will have two hundred million people, of which perhaps one hundred twenty million will live in the country.

What about the feeding of this great flock?

No one doubts that the farm is the basis of all industry, but it is more than that. It furnishes a large per cent. of the best men for all purposes. In Chicago, twelve of her greatest preachers, 75 of her leading machinists, 80 greatest lawyers were raised in the country. The Scriptures furnish an abundant record: Moses with his rod; Shamgar with his ox-goad; David with his sling; Gideon, &c., suffice. In Boston 87% of salaried men were raised in the country while 80% of pauper labor were raised in the city. Of 5,000 delegates to a world-wide alliance, 85% of this cream of a great denomination were raised in the country.

It is easy to collect figures to show failure of crops and stock, but who will say figures can tell the truth about moral failures? For instance, in our own State it cost $200,000 to take care of the criminals of just one family in just a few years. Suppose this family had been producers of good stock of men and women, figures would be powerless to show the benefit as they are now to show the loss.

The church must make it possible to produce men of the type of Washington and Lincoln. As long as the helmet of salvation is lacking, little Davids can slay giants as it exposes the target for pebbles. We need men to-day whose presence will inspire as much as the addition of 1,000 men. It takes more manhood in bloodless battle than in open warfare. If the prediction that in ten years all farms will be in the hands of scientific farmers trained for a better agriculture come true, does it not go with the saying, it will make a mighty difference in the kind of characters they possess? A successful farmer must include the HOME as well as crops and stocks. It is just as humanitarian to raise good crops as to send a gift to the sufferers across the water; more so. The farmer must be taught that as he increases the nutritive value of his crop he increases the health of his nation. The church must present the Divine claims upon him as well as the claim of his fellows. Give me men and I can make their own atmosphere and environment. The gravest danger to-day is secularism. No work is secular that is worth doing at all. We must hold to moral standards and methods of helpfulness.

If we had Christian ideals in the Old World we would have no such war.

We must put the Divine into all human relations. Great leaders in agriculture as well as education look for and need the sympathy of the church. They ought to have it. The top notch soil and highest grade school need the engine which the church should furnish. **Ford car** assembled in 30 minutes was run 7 miles, then it **stopped** when upon examination it was found it had no engine it was easy explained however it run on its merit. The church and farmers' institutes could work wonders, the church for inspiration, the institute with plans.

To-day is a crisis in the whole worlds' history. See the great discontent and want of confidence. You cannot stop it by driving it beneath the surface. To me this is the biggest asset to the whole thing. If the farmers, as a class, were not included in this discontent, there would be room for doubt. His discontent shows a door of opportunity.

Opportunity has chin whiskers and is bald headed. Catch it as it come or be forever too late. The blind staggering multitude want a guide. No living on memories of past achievements, or glorying in ecclesiastical respectability with half dead membership can solve the problem we are looking at. The church that will win must be larger than denominationalism. If denominationalism should die to-day we could solve the problem to-morrow.

No church will ever raise any higher than the expectations of its pastor, and no pastor's expectations any higher than the school to which he owes his life. We need more than anything a new rural leadership. The country church is forsaken by the ministry. That is, they go there to get a start, using it only as a stepping-stone. This is most unworthy of any man.

The country church has been killed by the disinterestedness of the cloth. The heads of the denominations are not without blame. Sending pigmies to do giant's tasks without even the skill to use the sling. You can not save the souls of a farming community without you take account of the body and mind of his family and make much of a job of it. Under some conditions I have found lots of them without much of a soul to save.

Wherever there has been a real successful country life, religion has had a very prominent part in making it so. We have given the farmer new machinery, new methods, then we thought he was free. Like the freedom of the slaves, we forgot we did not change the shape of their head and expected too much of them.

We must give the farmer a new relationship to his calling. The more science you give a man without leveling it up with grace, the weaker the man or men. The country church must minister to every home and help every individual in this territory or it has not done its work.

Show me the church and I will tell you the country condition. The church must teach co-operation by deeds. The home, the church and the school must pull together, then we have a real farmers' union. When all parts hold a right relationship to each other then we can have an ideal community.

Every man must devote himself to the betterment of the whole community. We need a new social consciousness while we are figuring for better prices for our crops and stock. The greater part of the migration to towns by the farmers has come from a failure to see his own responsibility to the community. The farmer is a real necessity and must be made to carry this responsibility. A sick hen will have plenty of night visitors, every louse and mite will call at night; poor soil invites all the vile weeds, so the sickly church in the country has invited all the disorders that are attendant upon disease.

The country church must teach that "get-rich-quick" schemes are from low desire. Godliness with contentment is great gain. That would half solve the boy problem. A boot-black, shining a cripple's shoes refused additional charges for double work required, saying: "I don't want to make money off other peoples misfortunes." He had the right spirit.

There is no place where the spiritual life is susceptible of as high attainment as in the country. Every truth has a double meaning here. The farmer will always listen to a man with a message to him. But it must be to *him*. Dr. Philips, first talked about horses, then cows, then school, each time showing ignorance. One day he spoke of siloes and he was invited into an intimate relation to that home.

My own observation is that the farmer's son is worth two city chaps under same conditions. This ought to appeal to the ministry. We hear once in a while that farmers won't get together or get together so far apart. That comes from trying to hold together from the outside. The church is the only institution that can work on the inside, therefore it has a great responsibility. The Lord's Prayer is the expression of a Divine co-operative commonwealth upon its knees. It asks for everything else before it asks for bread. Until the country church can pray this prayer truly, its power will be only over a few people but when it sees the whole community before it seeks selfish satisfactions, it will save the community.

I have met with churches that were too holy to hold institutes in; maybe they were good, but good-for-nothing. The church has been so intently interested in staying beside the cemetery that they are competitors for greatest degree of lifelessness. I saw a sign the other day. *"If it is not electric it is not modern;"* so a church today must electrify the life of the farmer. It is a crime to waste the Lord's money in trying to do his work in the country without trained men whose work does not overlap.

We must develop a family religion. What made the lack of reverence in the country when the family altar fell down, irreverence like all weed seed, grew in its place. Anything forced upon the farmer from the outside does him little good; for instance some good salesman sells him a piano with no one to play it. He teaches a child music, then he has a real use for it.

The best book on agriculture is the Bible. The biggest job to-day is the country minister. The country church is not a failure because it has not been tried. We need to hitch our work to a star of hope. We sing, "We walk with the King;" we need to work with the King as farmers. Some inspiration in that. The successful farmer must be his own greatest competitor. Nothing to beat another, but great honor to beat his best effort. Dan Patch, when he clipped another second off his own record, counted.

The evil influences of the hired man is another thing the church must take up. A large per cent. of them are not fit companions for the farmer's son.

Whatever affects humanity effects the church. Too many people think the church has no business in some matters. Of course she must not be simply meddlesome, but be possessed of the spirit of the Master. She must not only save the top soil of humanity, but the subsoil. We need no adulteration of or diluted Christianity. When the country church stands for the highest standards, for loftiest aims and noble purposes and greater unselfishness, then it will do much for the farmer and as much towards a larger rural population.

Knitting men together without love is a farce. All involuntary combinations is dangerous. It is like the apple that appears to be ripe and you find a worm is the cause of its changed color. Men are sometimes organized because of circumstances, these always fail. Nothing but love of the cause and love of each other can make a farmer's organization that will be worth the name. The men who have killed the country church are those who have made it a comparative organization. It is one that is different and must always be. No right to compare it to a lodge or union or club. All are useful.

SOME OF MY PLANS

I keep a close watch upon possible removals or sales of property near enough to my church to effect it, then look for customers whose coming to us will raise the standard. In this I have had some success.

I keep in touch with every farmer, his stock, are all part of my concern. Have only this last year attended to hundreds of cases of diseased poultry always without charge. I allow nothing he has to do or contend with to be foreign to me. I have found a month's work in farmers' institutes of more benefit to me than all my other training combined. I have heard him ask a lot of questions and heard them well answered. I read more farm papers than religious publications. We are having school for learners in plain sewing as well as embroidery and art work each Saturday afternoon, that is helpful.

We have children's play day Saturday afternoon when we try to learn the art of playing fair with each other. One failure with the country folk is that they have had little play together to learn co-operation.

I am now planning a campaign to install 150 bath tubs in my circuit. One of the physicians said, "Put me down for No. 1; that's real religion."

What is education for? To make men good citizens, not to make them better men than those who are less fortunate, but to make them able to help those who are not so well educated. The Lord's Prayer is nothing but a Divine co-operative commonwealth on its knees. There is not a selfish petition in it.

Our Father which art in Heaven, child speaks;
Hallowed be thy name, worshipper speaks to his God;
Thy Kingdom come, citizen speaks to the King;
Thy will be done, servant to his Master;
Give us this day our daily bread, beggar speaks to the philanthropist;
Forgive us our trespasses, sinner speaks to his Saviour;
Lead us not into temptation, pilgrim appeals to a guide;
Deliver us from evil, captive cries to a deliverer.

Prays for all the world before he prays for his own daily bread. Gives up his own will before he asks for a selfish thing, then he asks bread so he may be able to do something for others.

Do you know that the soul that tries to carry its own burdens alone soon becomes like the Dead Sea. No birds come and no grass can grow anywhere around. Do you know there is no way to world conquest that is not through Gethsemane and Calvary of self-interests.

The church has done lots in the past 50 years; hospitals, insane asylums, reading-rooms. But it needs to go a step farther and make these institutions free from occupants. We need to help misery, but better, make conditions so misery cannot live.

The good Samaritan was all right, but I would a good bit rather a man had arisen who made the good Samaritan unnecessary.

DIRECTOR MARTIN: Now, my friends, before we adjourn I have an announcement or two to make. It is our custom at each annual meeting to have a Committee on Resolutions. I believe there has been one death since we met a year ago. And other questions may probably come up for consideration, and hence I will announce as this Resolution Committee, Mr. B. F. Killam of Pike, Mr. S. C. George, of Indiana, Mr. W. F. Biddle, of Bedford, Mr. J. E. Hildebrant, of Luzerne, Mr. Lighty, of Adams, Mr. Patton, of Armstrong and Mr. Phillips, of Clarion. Any one knowing of other deaths or such occurrences as are proper for the consideration of this Committee, will please inform them of the fact.

Now I want to call your attention, just for a moment, to some features of our program to-morrow and of one or two subsequent programs. To-morrow morning's session will begin at 9 A. M. Mr. William A. Crawford, of Cooperstown, will be Chairman. The program is "A Definite Program in Breeding for Egg Production," which will be presented by so able a gentleman as Prof. James E. Rice, in charge of Poultry Husbandry, Cornell University, and will be illustrated by interesting lantern slides. Also our splendid poultry expert, Mr. W. Theo. Wittman, will present the subject, "Forty Popular Varieties of Poultry," also illustrated. Now, lest some of you may forget, I desire to mention to-night a feature of the program for Thursday night, which will be partially a song service by Mrs. Morgan of New York. I hope that none will miss that meeting and listen to "The Songs That Never Die." It will be a beautiful service, one in which we will all be interested and by which we will be instructed. Other features of the program we shall speak of later on. Please be prompt to-morrow morning at nine o'clock.

The meeting then adjourned.

Exposition Park, May 26, 1915, 9 A. M.

Director Martin in the Chair:—

DIRECTOR MARTIN: We have with us representatives of a number of the agricultural press. We have been honored by a representative of "The Ohio Farmer," and until the lights are properly adjusted, I know you will be interested in meeting the representative, Mr. Yocum, and listen to a few remarks.

MR. YOCUM: This is certainly an unexpected pleasure for me. I have only a few words. I want to say that I appreciate the opportunity of meeting this body of men, the men who have been so influential in advancing the Institute work of Pennsylvania. I certainly appreciate the opportunity of meeting every one of you.

DIRECTOR MARTIN: Is our friend, Mr. E. S. Bayard, of the "National Stockman," in the audience? He was here, I believe, yesterday evening for a time. Well, probably we may hear from Mr. Bayard a little later. Is the representative of the "Pennsylvania Farmer" here? I am not certain that I met a representative of that paper. While we are waiting a few minutes for the adjustment of the lights, I will say to the audience that there is a package of various bulletins of the Department of Agriculture brought here for distribution. Persons desiring to avail themselves of those bulletins will please just help themselves at any time.

Mr. W. A. Crawford takes the Chair.

The CHAIRMAN: The meeting will come to order. We will now proceed with the program in regular order, and the first speaker will be Prof. James E. Rice, in charge of Poultry Husbandry, Cornell University, Ithaca, N. Y., whose subject is, "A Definite Program in Breeding for Egg Production." I take pleasure in introducing Prof. Rice.

The address of Prof. Rice is as follows:

A DEFINITE PROGRAM IN BREEDING FOR EGG PRODUCTION

PROF. JAMES E. RICE, *In Charge of Poultry Husbandry, Cornell University, Ithaca, N. Y.*

Mr. Chairman, Dr. Martin and Friends: I think this is the third or the fourth time that I have had the privilege of meeting with this Board, and I assure you that I appreciate the honor and the opportunity. Pennsylvania is a great State; it has made a great history for itself, not only in agriculture but in its Institute work. I feel that coming here more or less as a specialist in Poultry Husbandry, that I am talking to persons who, perhaps, may give respectful attention, but whose business primarily is in some other branch of agriculture. If I speak more as a specialist, talking to persons who are directly interested in keeping poultry or in teaching poultry husbandry in Farmers' Institutes, you will know that I do it thoroughly understanding the situation and appealing to your consideration to listen as patiently as possible if you think the subject is being dealt with more technically than it ordinarily would be handled with farmers.

We are making wonderful strides in our knowledge of poultry husbandry. Unquestionably there is vastly more, however, to be known than we know at the present time. We must look to the practical solution of these problems that confront us, and some of them are exceedingly difficult and serious through a combination of forces. We need to have the scientific investigator at the expense of the State or the National government, trying out some of the things that are too expensive for the individual poultry man to do for himself, and we need the practical poultry man to put these things to the test. After all, it is the person who, on the farm, is caring for the hens, that is most likely to have the correct perspective of things, because he tries these things out in the crucible of every-day experience and he puts them to a dollar and cent test. Any scientific, or so-called scientific theory of inheritance, of breeding or nutrition or of poultry house construction or of incubating or rearing that cannot stand the test of the practical poultry man's use in making money with poultry on his farm, generally is not a correct theory and not a sound conclusion.

The subject assigned this morning is a specific one, the "Breeding of Poultry for Egg Production." The development of poultry husbandry in the East has been very largely along the egg producing line, because it has appeared to be the most profitable field up to the present time. I predict, however, that the day is not far distant when we shall have greater knowledge of the meat-producing values of poultry and that we shall give it quite as complete specific attention in our breeding. The industry needs it and there certainly is a wonderful field for development along the line of quick maturity of birds for meat production, having specially well developed bodies that will best meet the needs of the table as well as the production of high quality eggs. In a measure these two qualities can be worked out in the same individual, with perhaps as great money value in dollars and cents profit when all the factors are taken into consideration. I say this by way of explanation lest I be understood as thinking that we were ignoring the great meat qualities that always must be taken into consideration in any system of cost accounting of profits on a poultry farm.

The question of breeding poultry is especially important at the present time, due primarily to the increasing cost of the other factors of production. It costs us more to-day to feed our fowls than it did formerly, therefore it behooves us to see to it that the machines that we use in our manufacture of eggs and meat are of the very best quality, otherwise our food cannot be fed to the best possible advantage. With the higher price of house construction—because we are learning now the need of a good house if we are going to get the very best results in feeding or breeding, and with the increased cost of labor, reduced of course by various methods of labor saving appliances, but generally difficult to secure to work on the farm at reasonable rates, due to the competition of other industries, make it especially important that the birds that we do have shall all be good ones. Then taking into consideration the demand of the more critical public for a higher quality of product, it is absolutely essential for the person to-day who makes the best use of his poultry, to have birds that lay high quality eggs. They must have quality to compete and bring the prices.

We find that in trying to carry out this plan to secure a better quality and larger quantity of poultry that we have some exceedingly difficult problems to confront. It is a more difficult problem to breed poultry scientifically and well than it is to breed most other kinds of domestic animals, not because they are not more responsive. I think that poultry is moulded in the hands of man as freely as any other kind of animal and perhaps more so than most of them, but it is because of the fact that the flock of poultry has so many in numbers and the individuals are so small, so short lived and so comparatively inexpensive that a person finds it exceedingly expensive and very difficult to carry out any systematic program of breeding, covering a period of years.

Let me illustrate with a flock of fowls: In order to know individual merit, it is necessary to record the bird's pedigree, leg band them, trap-nest them and gather the eggs five or more times a day, hatch the chicks, leg band and replace the leg bands, and make the records of the changes in leg bands as the chickens outgrow them and keep the records of all that is done. With a dairy of cows having instead of several hundred individuals to go through the laborious process that I have outlined with chickens, we have one tenth as many or less individuals and have only to use a milk scale twice a day, or weigh less frequently and to use the Babcock Tester occasionally and we can tell our best individuals. When we finally have the record of the hens, they are with us only two or three years at most. When we have the record of the cow and establish the fact that she is a good one, we have her for eight or ten or twelve years. You see, therefore, the great expense and the intricate amount of careful record keeping involved if we are going to be as careful and as systematic in the breeding of our poultry as we are in breeding some of our other domestic animals.

Notwithstanding all these difficulties, it pays to keep some kind of account of the difference in quality of our birds and to breed accordingly. However, we may not use trap nests the year round. We may not possibly use trap nests at all, but we had better use them for at least a few months in the fall as a check on the accuracy of our observations of external characteristics. We are seeking a way to find out how to pick out the more productive hens from the less productive hens and the more valuable males from the less valuable males, in order that we may mate more intelligently. Even if we cannot know absolutely what the records of the birds are to an egg or to know whether these birds actually have pre-potent powers of transmitting these qualities to the next generation, we can get a good general idea of their value. In order to bring out some of these facts, I want to take a little of your time to-day.

There are at least ten points that we ought to try to accomplish in the breeding of our poultry for better egg production. These will be brought out and illustrated as I talk; but I want to emphasize two or three of the more important ones right now. First of all, we must see to it that our birds have strong vitality and great native inborn constitutional vigor. That is the foundation and the cornerstone of success. Whatever other factor is involved, whatever other character may be considered, that one, above all others, should be the one on which we base our procedure because without the native vigor to stand up under heavy feeding, we never can expect to get a big response in growth or egg yield. We need also to have pure bred birds of some well known breed as our foundation. The poultry man who to-day is satisfied with anything short of a good, pure breed of some one of half a dozen or more of our well known varieties, such as Rocks or Wyandottes or Rhode Island Reds or Leghorns or a number of others I might mention, is not living up to his immediate opportunities, because one can buy in any neighborhood with only a little additional expense for eggs or chickens, breeding quality that has taken men 50 to 75 or more years to bring up to its present state of perfection. You have then secured a foundation of uniform type as regards size and color, quality of egg, and of reasonably good production and good constitutional vigor if care is used in selection. We also need to have birds that have inherited a tendency to long life. The greatest handicap to-day to the poultry business is the comparatively short life of our birds. In Nature they might live 10 or 15 years or more; I have known them 13 years old in domestigation. We have a number of hens in the college flock now that are 6 years old, many of them laying fairly well. We want to impress the inherited quality of longevity upon our birds because we know that if a bird is born with a vigorous constitution and the inherited tendency to long life, it will be easier to rear the chickens; we will be getting individuals that can stay with us for a period of years and make it unnecessary for us to go to the most hazardous, most difficult, and most expensive process connected with poultry farming, namely, the hatching and rearing each year of as many or more chickens as we have mature fowls on the place. With the present normal life of our domestic fowl, a profitable life of only two or three years at most, it is necessary for every poultryman in the country to hatch and rear each year as many chickens as he has capacity for mature hens on his farm. A 1,000 hen farm must rear every year at least 1,000, and ought to rear 1,200 or 1,500 chickens in order to allow rigid selection. If we can by any means develop birds with longer lives so that we can keep them 3, 4 or 5 years as choice selected individuals to breed from, then we are impressing quality of longevity and we do not have to go to that heavy expense of rearing so many chickens each year.

We need to develop the quality of producing fertile, hatchable eggs. Many a man has succeeded well in getting high egg production but failed to hatch the chickens. There seems to be a limit to the endurance of a hen to produce 150, 175, 200 or 250 eggs a year and have enough vitality left to give us healthy offspring. The dairymen know what that means when they push their cows to the limit. It is the same with the hens. We must get reasonably high yields but this must be consistent with vitality in order that these birds will give us chickens as strong as their parents. If the poultryman cannot so organize his methods of breeding, feeding, housing and care that the next generation is going to be as good or better from the standpoint of fertility and hatching power and vitality, it will only be a few years before that person is out of the chicken business. Many a person has gone out by that doorway. There are some things that we know about breeding poultry, but not all. This question of securing heavy production, good fertility and strong hatching power is, at the present time, the most difficult thing we have to confront in breeding.

The next factor that we must consider is the question of quality of eggs. It is not simply the number of eggs that the hens lay that determine the profit. In my humble judgment we have been "barking up the wrong tree" a good share of the time in this question of breeding for egg production. The quickest results and the best paying results can be secured, not by increasing the egg yield even one egg per hen, but by improving the quality of the eggs that they lay. A person can increase the actual money earning power per hen anywhere from 25c to 75c per hen per year just by changing the size, shape and color of the egg without any particular extra effort on the part of the hen to produce this better quality. That is the easiest improvement to be made at the present time and yet it is one that is very seldom discussed or systematically practiced to any great extent.

Without attempting to go into details on some of the other factors to be considered, we will now have the lantern slides and bring out some of these points step by step in developing our subject. We will begin with the first factor, namely, that of constitutional vigor. We can always see things better by contrasts, so I have made a slide of one of the most abnormal, one of the worst possible specimens of low vitality. This bird actually existed. I photographed it myself and have pointed out by descriptive terms some of the vulnerable physical evidences of weakness which mark the individual. Most emphatically there is such a thing as constitutional vigor characteristics indicating strength or weakness that any person who is familiar with birds and who will study these characters can see for himself or herself and can pick out the birds of high and low vitality. I will guarantee to take this audience or any body of students and with one hour's talk with lantern slides and with the birds themselves, which is better than the lantern slides, make a large proportion of the class perfectly familiar with these characters so they can walk right in and pick out the birds of higher or lower vitality with almost unmistakable accuracy whether we are dealing with little chicks or with old fowls.

Let us briefly, with 3 or 4 lantern slides, point out some of these fundamental body characters that indicate vitality so that on going home you can go into your flock of birds and see whether you have among them any that show these particular physical characters. First of all, you will notice, as you examine that bird (Fig. 1) that it is developed abnormally, that it has an especially long, thin beak, thin body, long thin legs and shanks and long thin toes. The bird has simply responded physically to a weak constitution and Nature seems to understand that if a bird is unable to take care of itself, is not rugged, is not physically vigorous, that certain parts of its body grow while the others dwarf and stay dormant, so that the bird naturally takes on certain body characteristics as you can see by its attitude. It has a crouched position entirely abnormal. It does not stand up rugged and vigorous and virile. Is in a "dopey" sort of a condition. Therefore, look for the long flat thin head and beak, which we speak of as "crow-headed." Notice that generally there is a small, thin, pale comb; a dull, sunken eye, and drooping eyelids, thus indicating that it hasn't the life or vitality to keep its eyes open. Notice that there is a very sparse and irregular development of the plumage. A bird of high vitality generally is well plumed, glossy, full feathered, heavily feathered and quickly feathered. Note especially that they have a tucked up abdomen and a small development of the abdominal tract. Notice also that they generally have narrow, breasts, narrow

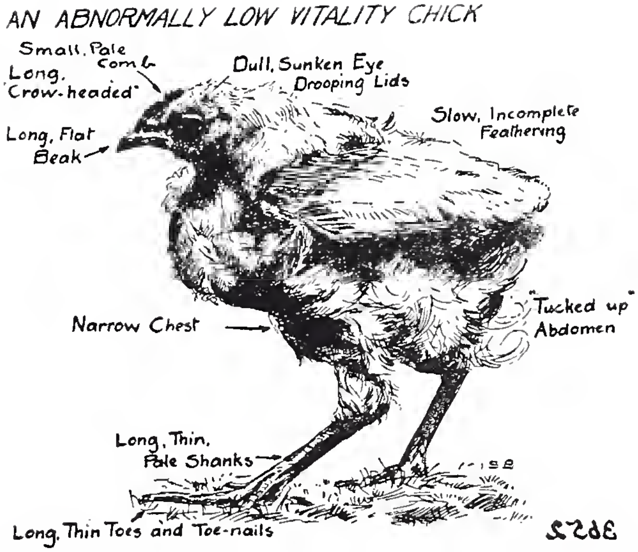


Fig. 1. An abnormally low vitality chick. Note the physical characteristics which indicate loss of physical vigor.

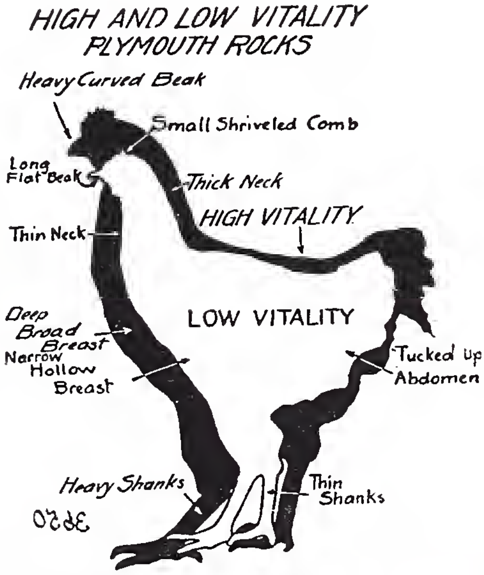


Fig. 2. Two Barred Plymouth Rocks. One high and the other low vitality, of similar age. Note the points of contrasts.

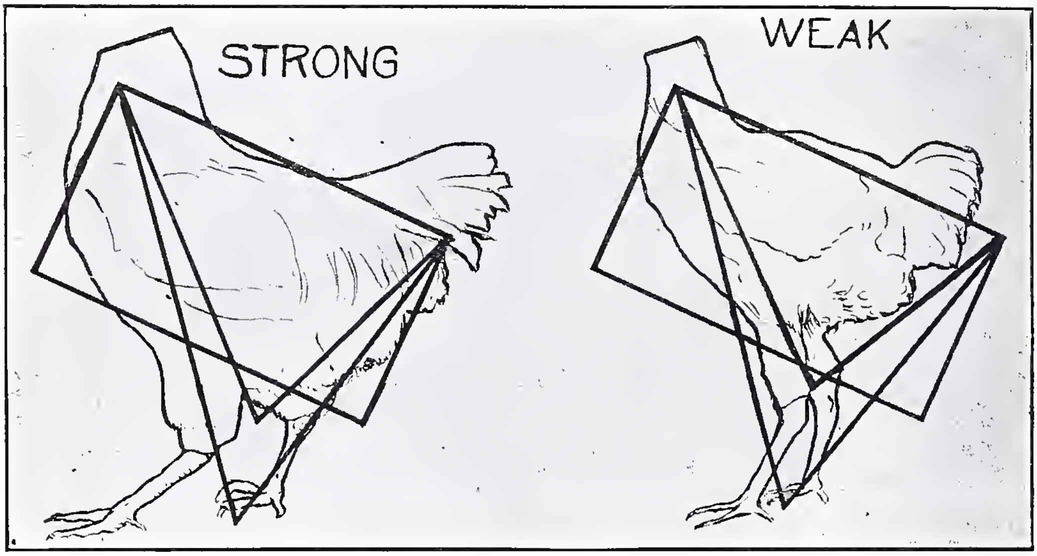


Fig. 3. Showing the way in which birds of high and low vitality fill a parallelogram and the two triangles. This clearly brings out the points of weakness in development of keel, breast and abdomen in the low vitality bird.

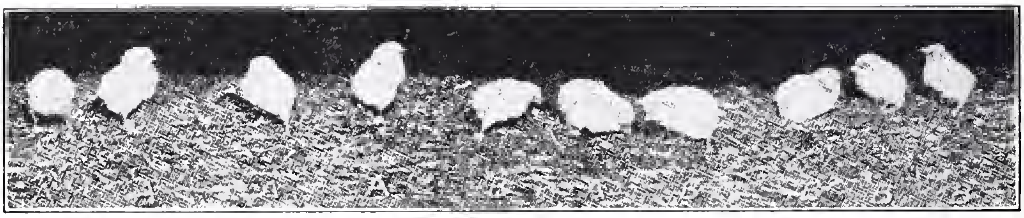


Fig. 4. Baby chicks just removed from the incubator. Note the difference in size, shape, and attitude of the body between A and B.

from side to side also from the back to the keel. These, generally then, are the main factors indicating low vitality. Primarily the differences are in the body capacity. Look for small body capacity, with low vitality, as contrasted with a very large, heavy body capacity with high vitality.

Perhaps you can see that better represented in Fig. 2 by super-imposing two Plymouth Rocks, one over the other. The low vitality bird is in white and the high vitality bird is in black. Now these were birds of the same age, and as you will see, almost of the same height, yet there were at least 2 pounds or more difference in weight. You will notice that all of the general characters that I mentioned in the previous slides are true here. Take this low vitality bird for example; there is a long, thin, flat beak, a thin neck, a thin keel, and a tucked up abdomen. There are the long legs and long shanks as compared to the high vitality individual that has such wonderful depth from back to abdomen, from back to keel, a heavy neck with a well rounded head, a medium to large comb, a heavy curved beak, heavy shanks. There in black is a high vitality bird. He is a splendid specimen of a Plymouth Rock from a constitutional vigor standpoint. This male unquestionably showed these characters from a baby chick right on up to full maturity and is worth infinitely more to kill to eat than the other one. He is a perfectly good specimen from the standpoint of his vitality for breeding purposes. The low vitality bird would not be worth anything from a breeding standpoint. Perhaps you can see the same idea brought out a little more graphically with the same individuals from a different photograph. (Fig. 3.) Here are the same two Barred Plymouth Rocks shown separately. By placing a parallelogram of the same size over the low vitality bird that you do over the high vitality bird here, you can see that the high vitality individual has a tendency to fill the parallelogram; the breast is full and deep so that it nearly fills it in front, and the abdomen is so full that it nearly fills it at the rear. We see that a bird of high vitality has the tendency to fill a parallelogram while a bird of low vitality is deficient in breast and abdomen. Notice the difference between that vacancy in the parallelogram at the breast and abdomen. That is the most convincing view you can get of birds of high or low vitality, and the same contrast would be true if you were looking at the birds from the rear or from the front, because the bird of high vitality is broad across the back and keel as compared to the bird of low vitality, which has a narrow back, narrow keel and is narrow between the legs. Frequently birds of low vitality have legs so close together that they nearly interfere. The bird of high vitality viewed from the front, the rear or the side fills a parallelogram while the bird of low vitality is more likely to fill a triangle. The same thing is true of the baby chicks. There is a baby chick (Fig. 4A) that is full of vigor, hard, full, round and plump, with an abundance of down lying close to the body. Here is another one, A, with its eye standing right out like a shoe button, the eye is full and expressive, the beak well curved and of good color, the chicken vigorous and active. One could have observed the vitality of these chickens even more accurately in life than by photographs. There is a chicken marked B of the same hatch, out of the same incubator. It has low vitality, and is a weak yeeping individual that probably will not live long; if it does live, it will be a "delusion and a snare" so long as you have it on the farm. Here is another (Fig. 4 B). There you see that same tendency to narrow chest, tucked up abdomen, and in the course of two weeks you see the same type of chickens. Notice that these three high vitality chickens (Fig. 5), with full developed bodies, strong wing pads, showing good feathering, with abundant down lying close to the head, and eyes, full and expressive; heavy curved beak; chickens that are upright, lively and peart. In Fig. 5 B are three chickens of the same age, with dropping wings. The wings of the weak chicks are not as large as those of the stronger chicks, but they look larger at first because the body of the weak chickens are so small. The bodies failed to grow. The attitude of the chicken indicates quite accurately its vitality. Here in Fig. 6 you will find four chickens of the same age, Rhode Island Reds, all hatched in the same incubator, brooded in the same brooder, fed on the same rations, and yet the largest chicken will weigh at least five times as much as the smallest chicken and will weigh perhaps a third more than the other two.

It is purely of inheritance or acquired weakness or both. These chickens marked A were born strong; the ones marked B were either born lacking vitality or acquired the weakness. They never can wholly overcome it. Sometimes they overcome it in a measure, but as a rule they are never chickens that could be kept on a farm beyond the broiler age with any degree of profit. The thing to do always in breeding up our stock is to select rigidly up to the time that we mate up our breeding pens, then select the eggs the right size and shape and with good strong shells, then select the strong germs. We have run experiments by which we could compare the strength of the germs every seven days and picked out those that were large and strong and vigorous and those that had low heart beats and small development. We carried them through to the hatching time and found a wonderful difference in the hatching power and strength of the chickens determined entirely two weeks before they were hatched just by the way the embryo developed. Whenever we see a low vitality chick at hatching time the thing to do is to kill it and at any time when they look listless at any age, dispose of them. After they reach an age of several weeks, frequently we can mark the weak ones with red paint and keep them until they are about one pound or more in weight and then sell them to make sure they do not get mixed up with the balance of the flock.

Here in Fig. 7 is the evidence of what can be accomplished by mere selection. There is a flock of pullets marked strong that were hatched from a flock of hens that had been selected for their strong vitality from a common lot. Here are pullets marked weak that are of the same age as these marked strong. They were hatched from eggs laid by hens that were of less vigorous vitality. Now the mothers of both of these flocks of pullets had all run together all summer long in the corn field and were simply picked out in November. The stronger ones were put in a pen and the weaker were put in another pen and the record kept of egg production, food consumed and hatching power, etc. The following fall, at the time this picture was taken, these pullets from the high vitality parents were laying; these from low vitality parents did not begin to lay for five to six weeks after the others; the former weighed half a pound apiece more at the time they were five months old than did the latter. That is a pretty big dif-

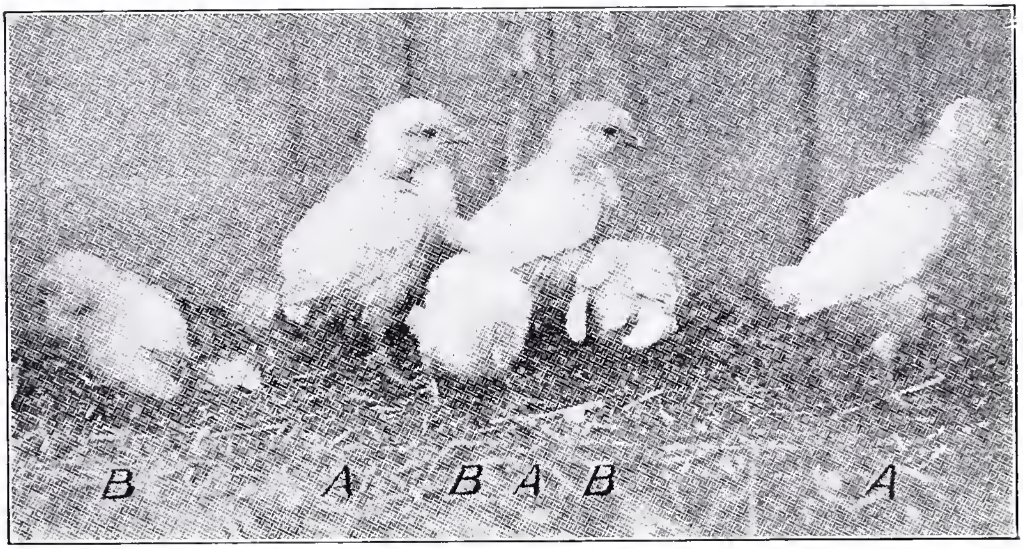


Fig. 5. Chicks 10 days old. Observe that in Group A the chicks are of larger size and with better developed wings and tail and with feathers close to the body, as compared with Group B.

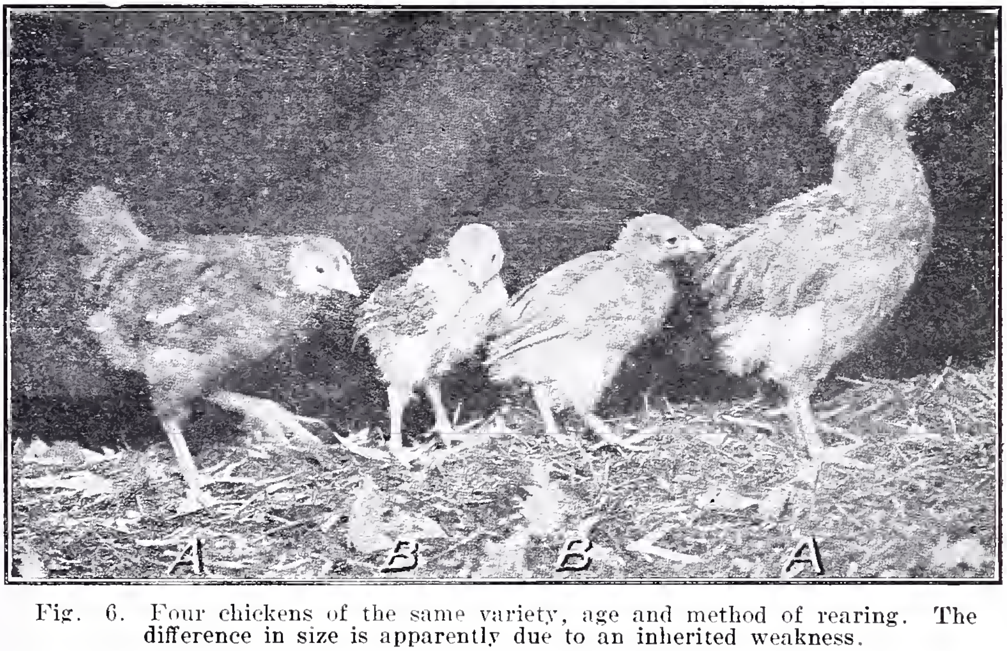


Fig. 6. Four chickens of the same variety, age and method of rearing. The difference in size is apparently due to an inherited weakness.

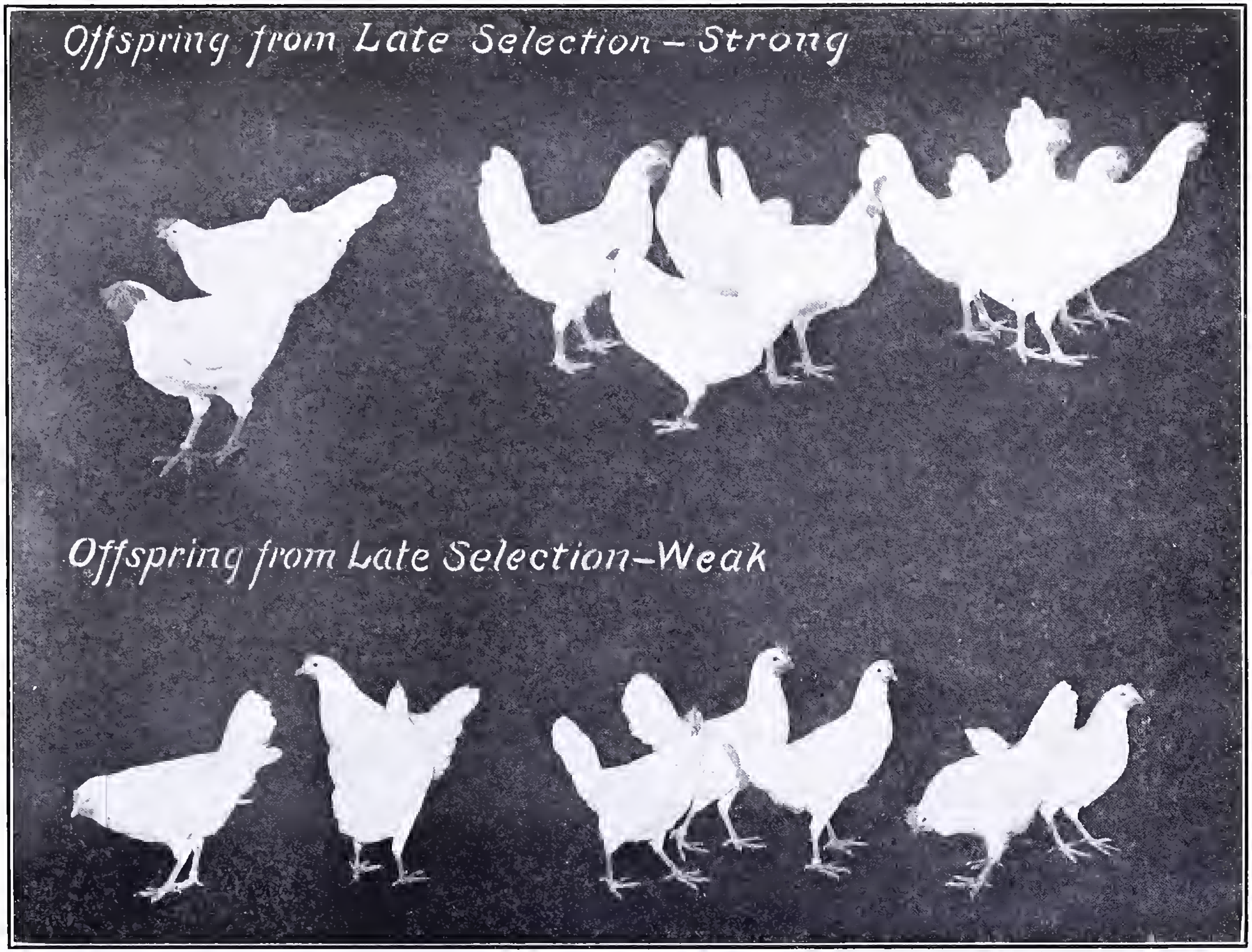

Offspring from Late Selection – Strong
Offspring from Late Selection–Weak

Fig. 7. High and low vitality groups of White Leghorn pullets indicating the way in which physical characters are transmitted from parent to offspring. The strong vitality group were from high vitality hens. The weak vitality group from low vitality hens.

Figs. 8 A, 8 B, and 8 C. Three flocks of cockerels selected according to their physical vigor. Note the characteristic poses and actions indicating physical vigor or weakness.

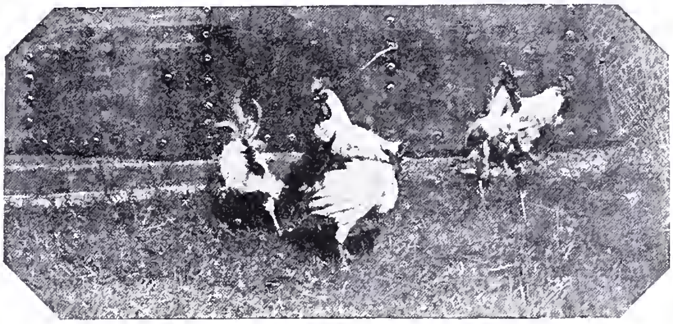


Fig. 8A. Birds of high constitutional vigor.

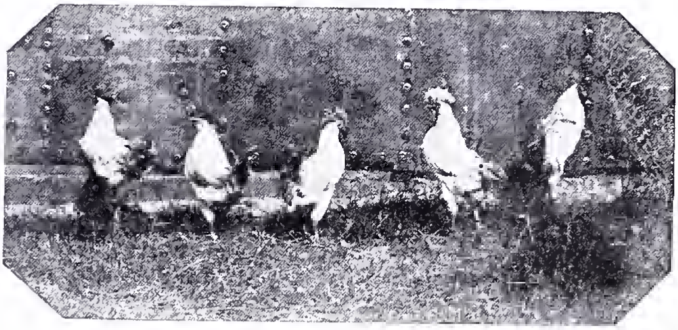


Fig. 8B. Birds of medium constitutional vigor.

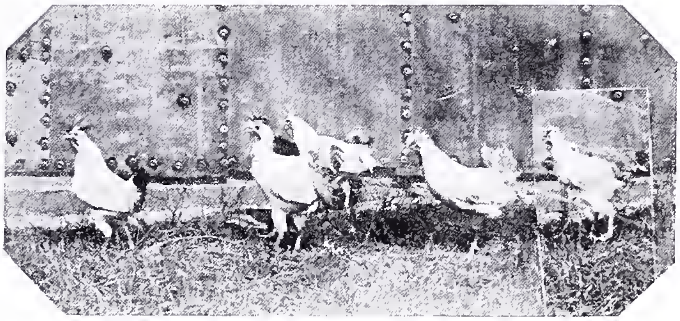


Fig. 8 C. Birds of low constitutional vigor.

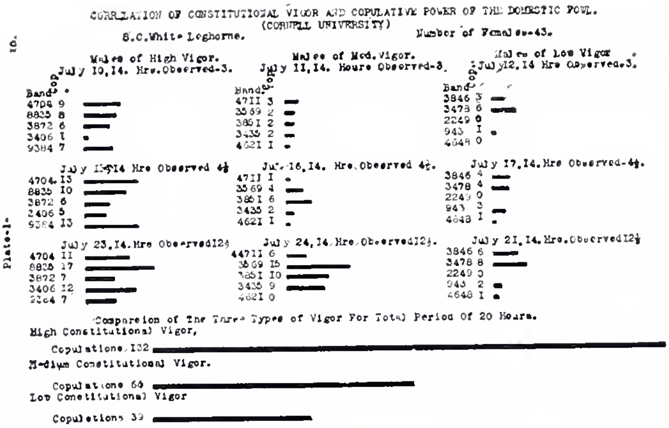


Fig. 9. Note the difference in the length of the lines which indicate the relative mating power of the three flocks of males shown in Fig. 8.

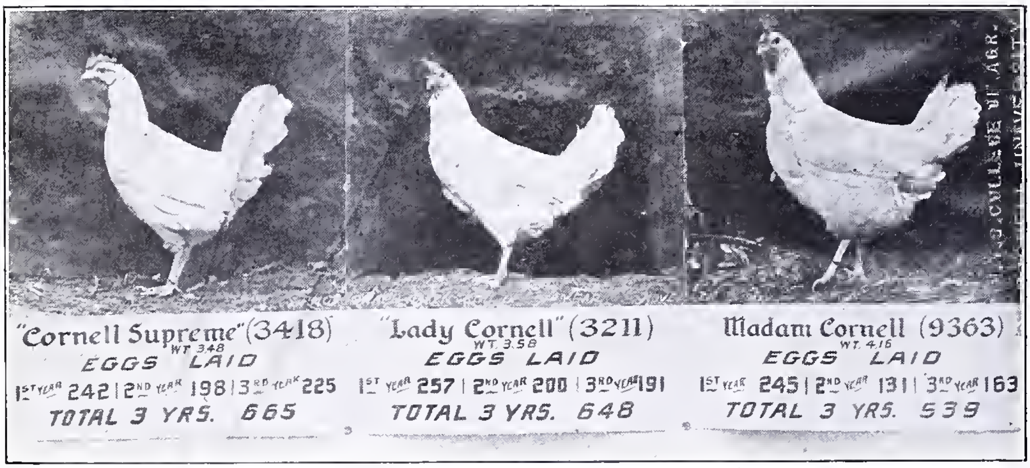


Fig. 10. The three highest producing fowls discovered among the flocks at Cornell University. Observe the differences.

ference for Leghorns that would ordinarily weigh only 2½ to 3½ pounds apiece, due purely to a question of inheritance—they apparently inherited their vitality from the parents. They were better layers. The records showed that these pullets of high vitality, like their mothers, laid eleven and a fraction more eggs each year in the case of the mothers and between twelve and thirteen eggs per hen more in the case of the pullets than those of low vitality.

Knowing the audience that is before me, teachers who must know the truth, I know you will excuse me for discussing a question that, in some audiences, might be considered inappropriate or indelicate, I do not know of any way to impress the truth except by telling it. One of the most important problems that we, as poultrymen, have confronting us is the problem of getting fertility and hatching power in the eggs, particularly layers, in early spring. We all recognize the fact that there is a big difference in this respect between individuals. I think, as a rule, farmers are likely to pick out the best males as regards vitality if they make any selection at all unless they get blinded by the color as some do; they usually pick the biggest and most active ones. I think that as a general rule is a good rule. It is well that we have other matters under consideration at the same time. In order to know what the difference is between the active mating powers of the birds of high, medium and low vitality, we conducted some experiments this last Spring. We are continuing these experiments at the present time at the college. Birds of high, medium and low vitality are marked with different colored paints and then some person stays in the pen from morning until night, making accurate observations of the mating qualities of these birds with the same large flock of fowls in each instance.

Here (Fig. 8 A) is a picture of five males that were picked for their high vitality. Here (Fig. 8 B) are five picked for their medium vitality and here (Fig. 8 C) are five for their low vitality. These males had all been used in some sort of breeding experiments at the college and up to the time the observations were made they had all been running together at the close of the breeding season last Spring in one large flock out in a place that we had built especially for their accommodation in the summer. One of our students, with the aid of one of our instructors, went into that large flock of males and picked out these individuals because of vitality, their size, their activity, their evident gallantry, ther sprightliness and those general characters that I have already described in the first slides shown in the lecture. They picked those marked low because they lacked in vitality qualities. They may have been just as large or they may have been larger in size, but they did not show those other characters that were necessary to get the right quality of vigor, and these marked medium were just about half way between the best and the poorest.

You will notice that this picture (Fig. 8 A) appears to be blurred. Though we took several pictures—we found it impossible to get one of that bunch of five without finding some or all of them scrapping. This picture shows that one fellow is spoiling for a fight, and this one is getting ready to declare war on that one and the other is not neutral by any means. Like the five nations of Europe, now at war, they are all at it, every last one of them. Among the low vitality you don't notice any evidence of scrapping. They are all looking around to see if anything is coming to get them; every one of them is on the lookout to "get out of it." The strong birds are on the lookout to "get into it;" that is just the difference between the two lots. The high vitality want to get into the scrap, and the low vitality want to get out of the scrap, and medium vitality are about halfway between. Here are the actual results of the mating observations. These lines here shown in Fig. 9 represent efficiency in mating of the individuals in all the different times that they were compared. The largest lines represent the number of matings of males of high, medium and low vitality, so you will see how these different tests resulted. The figures are the results of the 1st, 2nd and 3rd tests with the same individuals. Here are the males of medium vitality, 1st, 2nd and 3rd tests. Here are the birds of low vitality, 1st, 2nd and 3rd tests. When you come to add all these three together in each of the three groups, we get these lines at the lower part of the illustration and we find that during those hours of observation on those particular days, there were 132 matings of these five individuals of high vitality, 64 of these of medium vitality, and 39 of these of low vitality. The question for us to settle is whether it pays to spend a little time in daily observation of the individual characteristics of our males before we undertake to let the result of an entire seasons' hatching go by with infertile eggs and inefficient matings just because we have not taken the time to find out whether the males were strong or weak.

Another factor of importance is to know how hens differ in fertility and hatching power.

A COMPARISON OF THE FERTILITY AND HATCHING POWER WITH THE EGGS PRODUCED PER HEN.

Eggs Laid in Two Years of Production.	Number hens.	Eggs incubated.	Per cent. fertile.	Per cent. chicks to eggs set.
175 or less,	5	58	100	69.0
176-225,	11	194	90.8	56.7
226-275,	27	427	94.0	63.2
276-325,	19	291	95.5	66.0
326-375,	16	241	95.4	58.6
376 and over,	4	64	82.8	42.2
Summary,	82	1,275	93.0	61.2

Table I. The way in which hens of widely different laying records differ in fertility and hatching quality of theiir eggs.

Table I shows the actual results of the carefully kept records of a year with birds in the college flocks. Here we find, all told, 82 hens under consideration that laid 1,278 eggs that were carefully tested. They averaged 93% fertile and 61% of these hatched. These hens are grouped into these different collections, those that laid in two years' time 175 or less eggs—that is pretty low production; 176 to 225, then 226 to 275. You see we increased about 50 eggs at a time or 25 eggs per year per hen is the difference in the grades here used. The number of hens in each one of these groups is shown and the number of eggs used in each one; also the percentage of fertile eggs in each group, and the percentage of chickens hatched in each group. Notice that we get our best results ordinarily (with just one bare exception) in the percentage of fertile eggs that are laid by birds that are of medium to high production rather than with the birds that are either excessively high or excessively low producers. It would appear, therefore, from these data and other observations, that birds of low vitality do not give us good fertility or good hatching power because they are likely to be weak physically during the breeding season. It would appear that birds of exceptionally high egg yield failed to give us good fertility and hatching power because they have weakened themselves by heavy laying. In one case we did not get our good results because we had good hens that outdid themselves, and in the other instance because we had poor hens that were physically weak.

The next few slides will deal with some remarkable hens that have been discoverd rather than produced, as a result of our trap-nest experiments. I hope to make the point clear, that in discussing these very high producing birds, that you should not give us any particular credit for it except as regards proper care, because, in my humble judgment, there are thousands of birds in this country exactly as good as the ones here shown, only they have never been discovered. They are in the flocks and doing the work; but it needs the trap nest to bring them to the surface. There is a little hen (Fig. 10) that laid 257 eggs weighing 29 pounds. She ate practically 110 pounds of feed and gave us 72 pounds of voidings and laid in one year's time, over five dollars worth of eggs at market prices. That bird (Lady Cornell) is one that ought to be perpetuated. These three birds are the most valuable fowls that we have discovered in the flocks. They are on their sixth year record. Some of these died in their fifth year; but we have others of the same general group that are still with us. This bird (Cornell Supreme), the best one of the lot, laid 665 eggs in three years' time and laid 225 eggs in her third year. These birds that died, apparently did so not because of any physical breakdown, so far as we could see. Cornell Supreme laid an egg the day she died. She suffocated during an exceptionally hot spell on a very sultry day two years ago, apparently when in the very best of health. Look carefully at the type of those three high producing birds. They are alike. I don't believe that it is possible to absolutely pick out an egg type fowl and say that this bird is or is not purely on account of its *shape* a high producer. I am a firm believer in certain physical characters, as indicating production. At the same time there is something inborn in the bird that does not always necessarily show in shape, that determines her high producing power.

YEARLY RECORDS FROM DATE FIRST EGG WAS LAID OF SOME OF THE HIGH PRODUCING HENS AT CORNELL UNIVERSITY

Date hen laid first egg.	Hen number.	Name.	Eggs laid first year.	Eggs laid second year.	Eggs laid third year.	Eggs laid fourth year.	Total four year record.
Dec. 6, 1909	3,211	"Lady Cornell,"	258	200	191	123	†772
Nov. 24, 1909	9,363	"Madam Cornell,"	245	131	163	83	†622
Nov. 20, 1910	5,697	"Cornell Prolific,"	243	162	146	119	670
Dec. 8, 1910	5,626	"Cornell Laywell," ..	205	165	159	124	653
Dec. 10, 1909	3,418	"Cornell Supreme,"..	242	198	225	124	*789
Dec. 4, 1908	1,463	"Cornell Suprise," ...	180	186	196	....	‡562
Dec. 8, 1911	8,686	"Cornell Persistent,"	192	197	178	....	§567

*Fourth year incomplete. Died July 3, 1913.
†Four years complete. Died in fifth year.
‡Three years complete. Died fourth year.
§Three-year record.

Table II. A list of the first, second, third and fourth year records of seven high producing hens at Cornell University.

We now come to the question of breeding our birds with regard to discovering their ability to live long and produce well,—which may be called their longevity. Here are the records of a good sized group of birds that have now completed, in this instance, their four year records, but we have their fifth, in which, it is seen that this particular bird laid 772 eggs in the four years' time, laying 258 eggs the first year, 200 the second, 191 the third and 123 in the fourth year. The best bird in the lot, laid 242 the first year, 198 the second, 225 the third and 124 in the fourth, or a total of 789 eggs in the four years' time. Here is a bird that is exceedingly surprising and she was named Cornell's Surprise on that account because she laid 180 eggs the first year, 186 the second and 196 the third, increasing her production each year. This bird we still have with us and we are hoping for great things because of her persistency in production, laying such a high average each year, 192 the first, 178 the third, or a total of 567 eggs in the three years' time.

A Member: I note all these hens began to lay very late in the Fall. Do you intend that that should be so?

PROF. RICE: No sir. Ordinarily it would not have been true, but the birds were hatched late and therefore began to lay late. If these birds had been hatched early they unquestionably would have begun early to medium early in the Fall to lay.

A Member: How late?

PROF. RICE: Frequently when they are around five or six months old. Some of our high producing birds, however, do not begin to lay until they are six or seven or eight months old. The birds that do not begin to lay until they are nine or ten months old, almost always are medium to low producers. In order that we may find out how important that is, we keep our best birds for a period of several years. We are going to call attention to some of these distribution records of hens whose records are known for three years, to show how easy it is for a person to kill the best hens he has on his farm and never be any the wiser unless he knows their individual records.

DISTRIBUTION OF EGG PRODUCTION BY ONE YEAR PERIODS AS AN INDICATION OF PROLIFICACY. THREE CALENDAR YEAR RECORDS OF 169 S. C. WHITE LEGHORN HENS AT CORNELL UNIVERSITY.

Groups.	Number of hens.	Per cent. of total.	Average production, first year.	Average production, second year.	Average production, third year.	Total average production, three years.	Three-year rating of groups.
I,	80	47.34	158.68	127.60	102.91	389.19	3
II,	8	4.73	91.00	107.86	115.25	314.13	8
III,	21	12.43	149.86	111.95	120.38	382.19	4
IV,	21	12.43	95.48	134.29	119.52	349.29	7
V,	21	12.43	119.05	133.90	99.38	352.33	6
VI,	11	6.51	130.45	121.27	138.09	389.82	2
VII,	1	.59	86.00	54.00	54.00	194.00	10
VIII,	2	1.18	100.00	129.50	129.50	259.00	5
IX,	2	1.01	58.50	58.50	63.50	180.50	11
X,	1	.59	147.00	147.00	132.00	426.00	1
XI,	1	.59	80.00	72.00	80.00	232.00	9
Total for all groups,	169	100.00	136.92	124.48	109.18	370.57	....

Table III. Tables showing the distribution of egg production for three years in groups to show when they made their largest, medium and lowest production.

These are the records, shown in the case of 169 hens that lived for three years and were trap-nested. This does not take into consideration any of the hens that died i nthat time; it means all the hens that lived for that length of time that were in this experiment. We grouped these according to whether they laid the most eggs the first year, the second year or the third year. You see if we have the three year records of 169 hens, they must have laid the most or the least or the medium production of eggs the first year or the second or third year or else they must have laid the same number two or more years, hence we have grouped them up that way and we find that out of the 169 hens 47% or 80 out of the lot laid the most the first year, less the second and least the third; that the order of the production was highest in the first year and then a declining scale for the other two years and they laid 389 eggs in the three years time and stood third in the list of groups. The next group reversed the order. There were only 4.79% but their order was the least the first year, more the second and most the third, but laying all told only 314 eggs in the three years time. They were poor producers even though they increased each year for three years never laying an average of more than 15 eggs in any year. Then we had a group of 12 and a fraction per cent. that laid most the first, least the second and came up in the third and laid 382 eggs in three years, only 7 less than the group we first considered. Then we had a group of 21 birds that made the poorest record the first year, best the second and medium the third, 349 eggs, and they stood seventh. We then had a group of 12% that laid the minimum the first, the most the second and the least the third. They laid 352 eggs. Then we had a combination that laid medium the first, least the second and most the third; they laid 389 eggs and stood second in the combination. Finally the highest group record in three years' time was by an individual that was a consistently high layer and laid the same number the first and second years and laid in three years' time 426 eggs. The poorest one of the lot laid 232 eggs in three years only about 78 eggs a year. The point that should be emphasized is, that one can never know absolutely, the best hens in his flock unless he knows their records for at least two or three years, for sometimes they come up surprisingly in the second and third years and very frequently the birds that make the best records the first year, that is a very high or abnormal record, will be the birds that lay less eggs in their next year and rest, and come up again and lay more eggs in the third year than in the second.

A Member: Does your experiment only apply to Leghorns or all types?

PROF. RICE: I think it would apply to most breeds of Leghorn type. I do not believe it would apply in the same way with the heavier breeds; I think there would be a tendency perhaps for some of the heavier breeds to lessen in their production a little more rapidly as they grow older and yet that is only a guess.

A Member: Were these birds all treated the same in feeding and otherwise?

PROF. RICE: Oh, yes. They were all kept on the same farm, fed by the same man and had the same kind of rations. It is very fortunate that we have not varied our rations at the college in our experiments with birds for the past 7 or 8 years.

The next factor we want to consider is the question not merely of the eggs that hens lay over a period of years, but it is the eggs that they lay during various months of the year. What we want to know is the dollar's worth of eggs that hens lay. We not only want a hen to lay many eggs but to lay just as many as possible when they are high in price. One egg in the fall is worth three or four eggs in the spring. It is exceedingly important that we get a hen that distributes her production properly. We want October, November and December layers, and, therefore, that factor ought to be taken into consideration always in selecting our birds. They lay more dollars worth of eggs then with only fair production than the others even though they may not lay as many eggs in a year as hens that do not lay well in the fall. Generally, however, we have this in favor of the fall layers as pullets or hens that our records show that almost invariably the birds that lay the most eggs in the months of September, October, November and December, whether they are hens or pullets, are the birds that have also laid the most eggs in the year. The birds that only lay in the spring never lay eggs frequently enough to make up for the lost time in the fall and winter. The supreme test of the high producing quality of a bird is the number of the eggs she lays when the conditions are most unfavorable. This statement I am well aware is contrary to the opinions of some practical poultrymen and investigators, but I am perfectly willing to assume the responsibility for its accuracy.

Now just get this point. Never undertake to pick out high producing hens when the conditions are favorable for production. At this time all or nearly all the hens both good and poor are laying. When climatic conditions are against them the good ones only continue to lay.

A Member: Do you advise to feed these hens all they wish to eat when they are under this test?

PROF. RICE: Yes sir, all that they wish to eat of the right kind of dry mash feed, but not all the grain they want to eat. So long as they have all they can eat of dry ground feed, with its meat, bran, middlings, cornmeal, etc., fine ground dry feed and possibly a wet mash a day; and so long as they eat it up clean, there is little or no danger of overfeeding. The danger of overfeeding any flock of fowls is when they can eat all the grain, whole or cracked that they want without working for it. They are likely to fill up on it and become lazy and inactive, and lacking the physical activity or the keenness of appetite to exercise they become less productive.

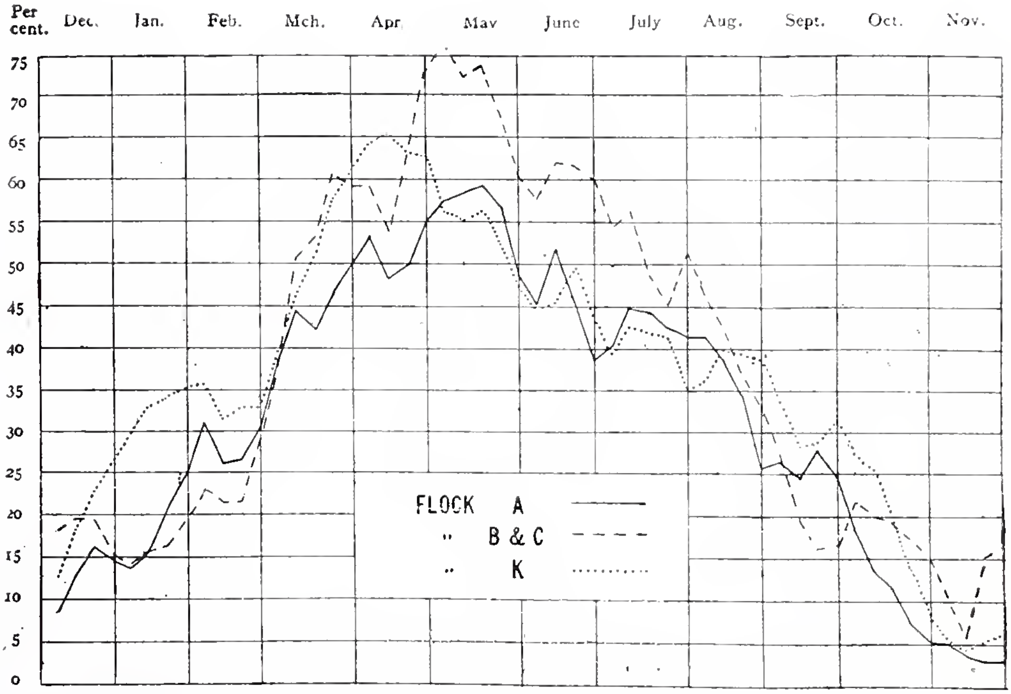
A Member: Would it make any difference if they had a little feed left in the evening?

PROF. RICE: Not at all, so long as they cleaned it up promptly the next morning. I think the idea especially in the winter of letting them have a little grain left over at night, so long as their appetites are kept keen, is a good one.

We ought to study the normal curves of production at different months. This slide (Fig. 11) represents the monthly percentage of production for a year, of three separate flocks of fowls in different parts of New York State, several hundred fowls were in each flock. The records were kept by men who knew nothing about what the other co-operators were doing and yet when these records were sent in every month and tabulated and plotted up at the end of the year, we find with what great uniformity these three flocks of fowls produced their eggs. Beginning over here in December we find that in all three instances their production was less than 20%. In some instances it was as low as 12% to 15%; that in the month of January it came to about 20% and 25% or in one case as high as 35%. In February they all came up a little; one dropped a little temporarily; then in March they all gave a big jump to 45% or better. In April it was up to 50% to 65%; in May one flock went as high as 75% and the others dropped a little; then came up slightly; in June they began to go down; then lower in July, lower in August, lower in September, lower in October, and reached their lowest point in all instances as low as 5% to 7% production per hen per day. We find that with mixed flocks of old and young Leghorns, as these were, farm flocks, that we can calculate with a good deal of accuracy about how the curve of production is likely to flow, in any year with any flock under normal conditions. This particular man who had the fowls represented by these dotted lines, had almost all pullets. The other two flocks contained a larger percentage of hens. One can count very readily on the higher percentage of production in those months with the pullet flock than you can with the older hens.

We are going to come to a little more detailed study of records of trap-nested hens at the college. Here are the records (Fig. 12) of 38 hens for three years. The solid line representing the first year, the dash and the cross line representing the second year, and the dash and dot line representing the third year of production of the same hens shows how the 38 hens laid each month of the year for three years. One record super-imposed directly over the other, will therefore show how they vary according to their ages in production. You will notice that the first year their record was 10% or 12% in November, that it was about 20% to 25% in December; that it dropped in January, came up perceptibly in February and up higher in March and still higher in April, and dropped a little in May, but sustained a pretty high egg yield clear through June into July, then began to go down gradually in August and September, and landed a little higher in the following fall than any of the others, so that you can see that in the first year, pullets, if they are hatched early so that they can begin properly to lay early in the fall, will lay much heavier percentages of production in October, November, December and January, when prices are high, than they will ever do after that; that they will also continue a high production the first year, all the way through, and lay a higher production in the following fall than do the hens in later years if all the birds are taken into consideration on which to base flock averages. In the second year they are slower to begin to lay in the fall. In third year, they are still slower to begin to lay in the fall. They all come up to about the same place, regardless of their age, during April, May and June. They all begin to go down just about the same way during July, August and September, but they quit a little earlier in the fall in the case of the older birds. Do you see the point? The tendency is to shorten up the production in those months of unfavorable laying conditions.

We have plotted curves of production shown in (Fig. 13) of each of three flocks of fowls, namely: 22 hens, that were hatched May 2nd; 21 that were hatched May 20th, and 20 that were hatched May 31st, to see how the time of hatching affects the production of the birds, not only the first year but the second and third year. Do you all thoroughly see the point? It is one of the most important factors in the successful commercial handling of birds, to get the pullets hatched at the right time of the year. We can hatch pullets too early or we can hatch them too late, depending upon the breed, the season and the location in which we happen to be living. If we hatch our pullets too early, they mature and begin to lay



The percentage egg-production for each month of the year varies with great regularity one year with another, always being lowest during October, November and December, and highest during April, May and June. Observe the wonderful regularity in egg-production of three flocks as shown above

Fig. 11. Plotted curve showing percentage production of three flocks of fowls in various parts of New York State. Observe the comparative uniformity in production of each of the flocks for the various months of the year.

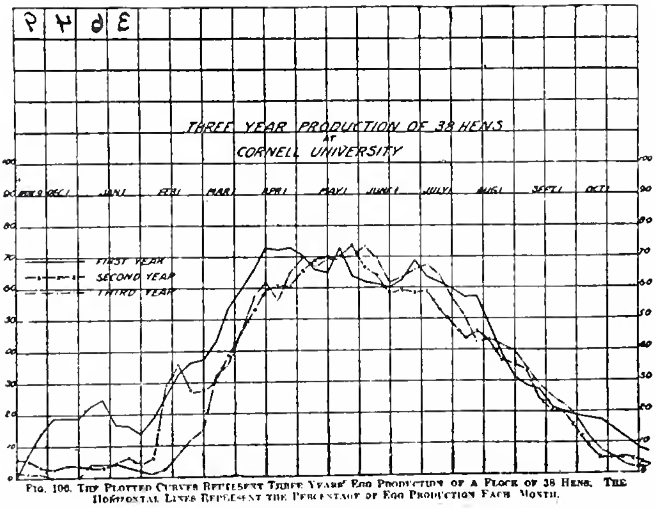


Fig. 12. Plotted curve showing the yearly production of 38 hens for each month of the year for three years. Observe the higher production the first year during the fall and early winter months as compared to the same fowls in later years.

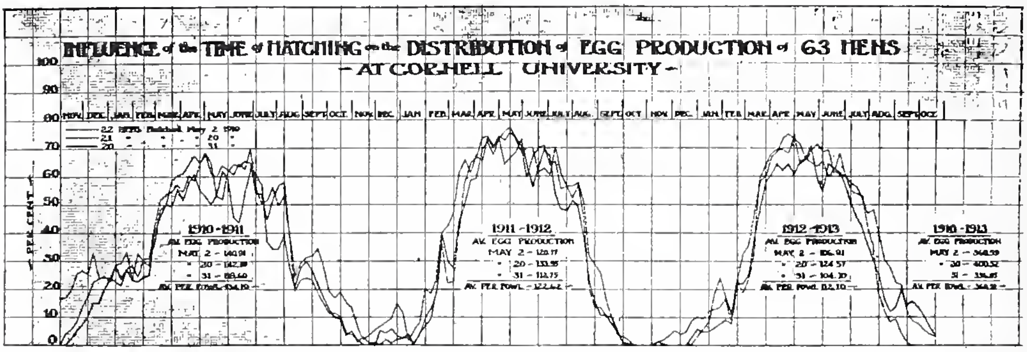


Fig. 13. Three years production of three flocks of fowls hatched at different times in the spring as indicating the effect of time of hatching on egg yield.

too early in the summer, in hot weather. They then go through a moult and are caught by the cold weather of the fall with their overcoats off, so to speak, and then they do not lay well during the early winter. If on the other hand they are hatched too late, they then are not fully plumed when the cold weather comes and as a result they, too suffer from the cold and do not lay well. The ideal conditions in New York State with Leghorns is to hatch the birds so that they will be ready to lay just before cold weather comes. The exact time that is best will vary a little one year with another. One cannot tell in advance, but we find that hatching in May—never as late as June, if we can help it, and never as early as March, but somewhere during April and May, and probably the very best about the first of May, in the long run gives us our best results, and yet when we come to consider the record of these three flocks of birds all reared the same way, hatched from the same kind of stock and given the same kind of care, the 22 hens hatched May 2nd, the 21 hatched May 20th, only three weeks later, and the 20 hatched on the 31st, which is only 11 days later—we find considerable difference in their production.

Now let us notice that, of the first hatch, they laid 140 eggs; the second hatch laid 142 and the third hatch laid 118 eggs the first year; the second year, the first flock laid 120 eggs, the second laid 133, the third laid 112. The third year the first flock laid 106 eggs, the second laid 124, the third flock laid 104; so that those birds that were hatched the 31st day of May, practically the first day of June, apparently were hatched just a little too late to get ready to lay when the early fall cold weather struck them, and they did not get under motion early enough in the fall and they never got over the handicap. All the way through the three years' time they were the last in the race. Now taking the 3 years' production as represented by all these plotted curves for each month of the three years, we find that the birds that were hatched on May 2nd, laid 363 eggs; those that were hatched May 20th, laid 400 eggs; those that were hatched May 31st, laid 336 eggs. If you will study the curves, you will see that point brought out clearly, namely: That as the hens get older, they lay just about the same number of eggs, same height of production in the months of April and May. Now notice that this curve of percentage of production is higher in the second and third years, even during April and May, than it was in the first. Why is that? Simply because in the first year they laid so heavily in these early fall months that it reduced their production a little in the early summer; whereas in the second year and the third year, they began later and later to begin to lay in the fall; consequently, when they began to lay, they gave a heavy production in those two particularly favorable months of April and May. When you come to plot the fourth and fifth years, as we are doing at the College, we find that they still maintain high yields in April and May; but they begin later and later to lay in the fall and quit earlier and earlier the following summer. I predict that when we keep those birds, as we hope to do, as long as they live, we will find that they will only lay eggs eventually, if they lay at all, in the months of April and May, the most favorable season of the year.

There in Fig. 14 is a study that gives us the actual daily egg production of each one of those bird that we saw represented in the previous illustrations. The first year's production of every one of those birds is shown in colors. Let us understand what this key represents. The first year's production for each month, beginning with November first until the following November, each block represents the days a fowl lays; a vacant space represents the time she did not lay. We have arranged these birds into three groups; the upper group was hatched May 2nd; the middle were hatched May 20th; the lowest were hatched May 31st. Each group you see was a different brood. Then each one of these groups are arranged according to time each one of the pullets in the group to the left began to lay. To the left are the leg band numbers of each fowl.

When we started the records in November, four birds were laying. How many eggs they had laid before we caught them in the trap-nest, I don't know, but I think you can get a pretty accurate idea when you study these records of production below, because you see these four had begun to lay when we started, this one laid next day, this one next and this one three days later, and so on until we find one hen that did not begin to lay until way over here the last of April. Notice the second hatch. The first hen began to lay a week after we started the records; the next one a week later, the next two or three days later, and so on, until the last one in that hatch began to lay the last of March. Then here is the third hatch—the first one began to lay two weeks after we started the record, and the last one began to lay way over here the last of April, but notice the point that they began, as a group, to lay just about the same time as the difference in the time of their hatching, i. e. each of the groups when we consider them in mass usually are two to three weeks late in production. Now you will say, I would like to know what those birds are going to do the following fall? If these birds, hatched a little later in the spring, began to lay later in the fall they must lay later the following fall. Let us see whether they did or not. Follow these lines and you will find these birds that were hatched first began to lay first, and were still laying the last day, absolutely the last day of October of the following year. How about the second hatch? Well there were three or four still laying at the time the year closed. How about the last hatch? Just about the same. In other words, here is what happens, as the next picture will show. (Fig. 15). When the cold fall weather strikes the hens they all respond in essentially the same way regardless of the time they were hatched the previous spring. That is exactly what these birds did, all stopped essentially at the same time, almost regardless of what time they began to lay. They did lay a little more heavily in the spring if they started a little later in the fall. You will notice in the first group there are more vacant places, representing the days the hens did not lay, scattered around in March, April and May because they had laid so heavily in the early fall. The later hatched pullets never caught up in their production. The second year (Fig. 15) these birds that were hatched late did not get down to business any earlier than the others. When you come to the third

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Fig. 14. Daily distribution of egg production of 63 fowls to show the way in which the time of hatching affects the time of laying.

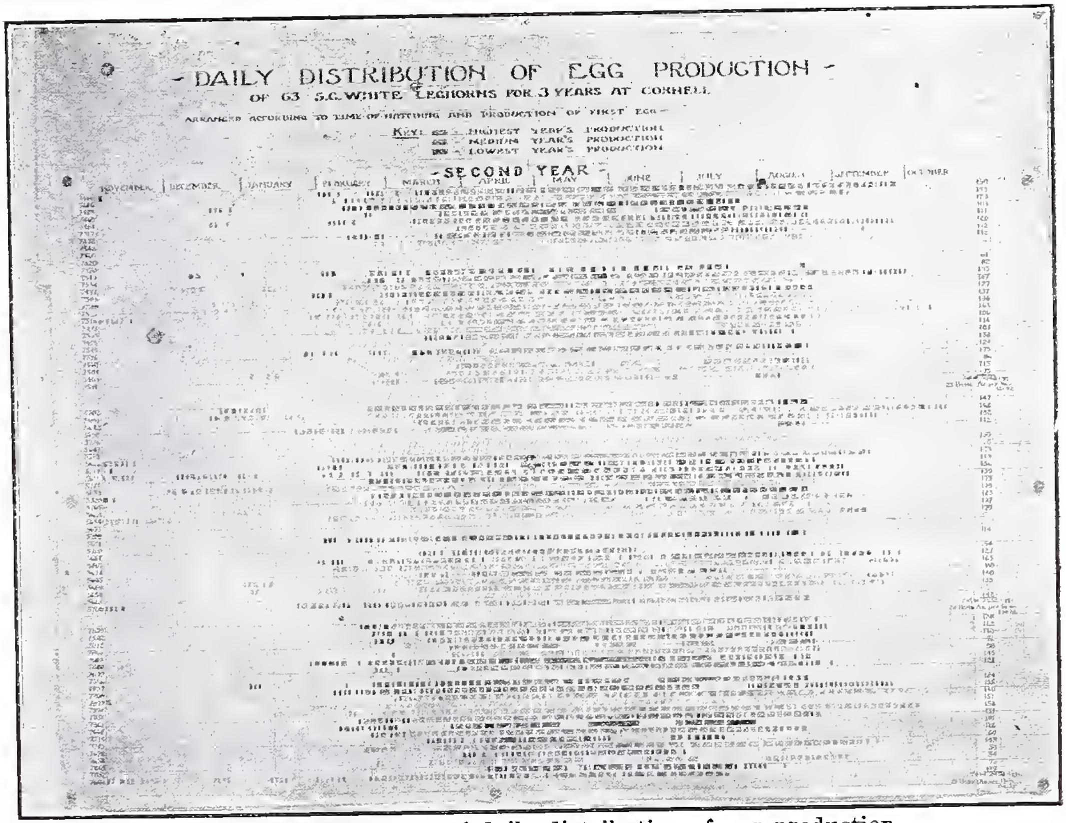


Fig. 15. Second year of daily distribution of egg production.

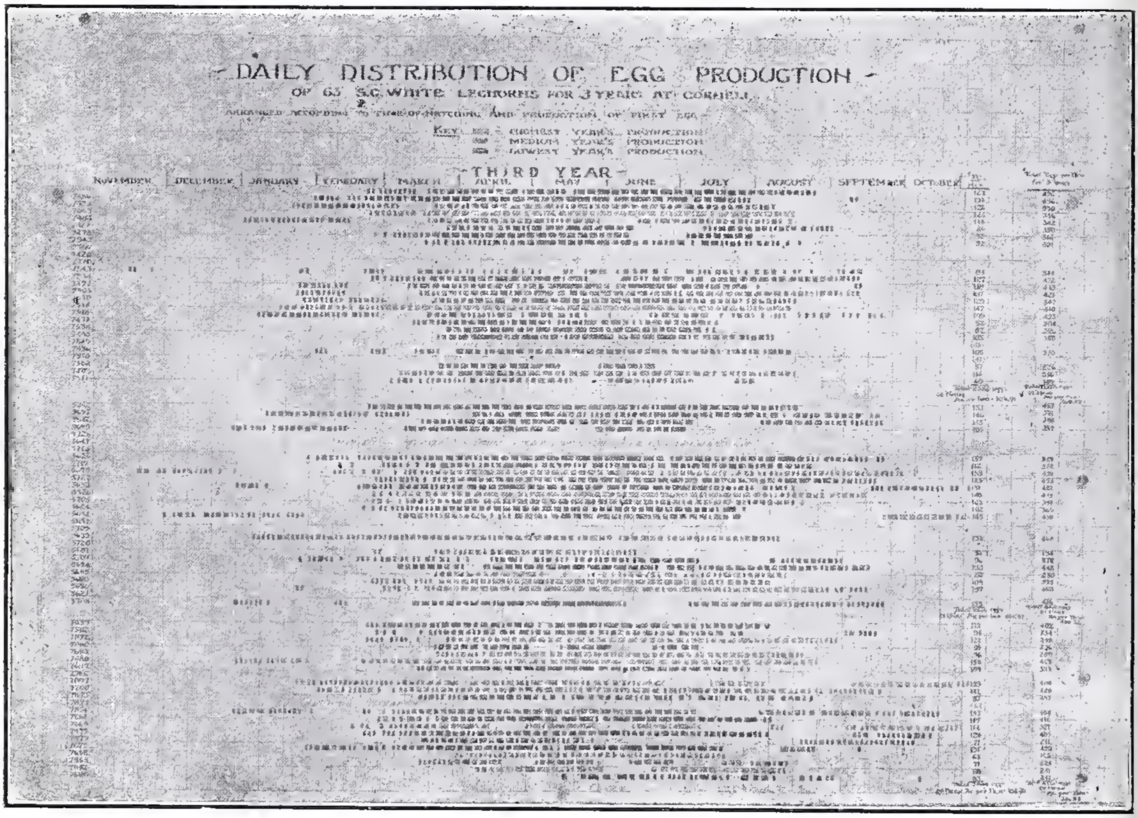


Fig. 16. Third year of daily distribution of egg production.

year, you will find that they did not continue any later. The point is that if birds are not hatched early enough to begin business early in October and November, they never get over it, never catch up the lost time. Here is the third year (Fig. 16), the same birds, and you will notice that each year there is less and less production in the fall of all three groups, but they hold to their heavy production in these early months, as shown by the previous slide.

Before we can make very much progress in breeding for egg production, we must decide on the meaning of some terms. I have taken occasion a good many times to talk with people about their ideas as to what constitutes good egg production. A man will say, "Oh I think a hundred egg hen, or a hen that is laying 125 eggs per year is doing pretty well." Another man will say, "A hen is no good unless she can lay 150 eggs or 200 eggs." If we are to decide what is a high egg yield, we must decide whether we mean the first, second or third year records or the total one, or three year production, so I took a test one day of 13 persons who had a good deal of experience in the poultry business and asked them to give an estimate of what they considered an egg yield should be to fit the following terms, phenomenally low, exceptionally low, very low, fair, medium, high, very high, exceptionally high, phenomenally high. There are some good terms to express yields of what would be considered a good flock of birds given good care on a poultry farm. What would they be expected to do to fit these terms? Here is the result based on the average of all replies:

A SYMPOSIUM OF GUESSES AS TO A GOOD AVERAGE FLOCK EGG PRODUCTION PER HEN PER YEAR TO FIT DESCRIPTIVE TERMS INDICATING VARIOUS GRADES OF PRODUCTION.

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total	Av.
Phenomenally low, ...	50	25	25	25	20	30	20	20	40	25	70	20	50	420	32.3
Exceptionally low, ...	60	50	60	40	40	40	30	40	60	40	75	30	60	625	48.
Very low, ...	70	75	80	50	60	50	40	60	75	60	80	40	75	815	62.7
Low, ...	100	100	100	95	80	70	50	80	90	80	90	60	100	1095	84.2
Fair, ...	125	115	125	115	100	85	60	95	110	105	100	100	115	1350	103.8
Medium, ...	150	125	150	125	120	100	75	110	125	125	110	115	125	1555	119.6
Good, ...	175	135	165	135	140	130	100	125	140	130	125	150	140	1790	137.7
High, ...	200	150	180	150	160	160	125	145	160	140	140	180	150	2040	156.9
Very high, ...	230	175	200	160	180	180	160	165	180	160	150	200	160	2300	176.9
Exceptionally high, ...	250	200	225	180	200	190	200	180	200	170	155	215	175	2540	195.4
Phenomenally high, ...	275	225	240	200	220	200	225	200	225	180	160	230	200	2780	213.8
Totals, ...	1685	1375	1550	1275	1320	1235	1085	1220	1405	1215	1255	1340	1350	17310	

Table IV. A table giving the result of estimates of the egg yield that would fit descriptive terms to indicate the productive power of fowls.

Phenomenally low, 32; exceptionally low, 48; very low, 62; low, 84; fair, 103; medium, 119; good, 137; high, 156; very high, 176; exceptionally high, 195; phenomenally high, 213. For a flock of 100 birds laying 213 eggs per hen per year I think if you search the United States from one end to the other you would not find them. You can see by these figures what some poultrymen of the country think about what constitutes high, medium, low or average production.

Our next problem is to try to find out how to pick out the high producing birds without the use of trap-nests, or perhaps, if we have trap-nests, when it will pay us best to use them. I should say that the first principle in selecting birds for egg production aside from their constitutional vigor would be to begin with their fall records as pullets, with this principle in mind, that an individual is likely to show early in life those characters that are likely to dominate it throughout life. We find that when our pullets are put to this test that if they are hatched at the same time early in the spring, say in April or May, and we know their ages so that chickens of the same age can be compared, if with good care they do not lay before they are 8 months old, we are pretty sure that they are not going to be high producing birds if we should keep them for a period of years. Once in a while we find an exception to this rule, but rarely, so that the earliness with which a pullet begins to lay—and by earliness I mean their *age* and not alone the time of the year that they began hatching.

EARLY EGG PRODUCTION AS AN INDICATION OF PROLIFICACY. THREE CALENDAR YEAR RECORDS OF 169 S. C. WHITE LEGHORNS AT CORNELL UNIVERSITY.

Group According to Age First Egg was Laid.	Number of hens.	Per cent. of total.	Average age when first egg was laid.	Average production first year.	Average production second year.	Average production third year.	Average total production for first three years.
151-180,	4	2.37	176.25	173.25	135.75	126.50	435.50
181-210,	71	42.01	199.77	157.01	133.63	116.41	407.05
211-240,	52	30.77	222.46	140.10	121.37	106.19	367.66
151-240,	127	75.15	208.32	150.60	128.67	112.54	391.81
241-270,	22	13.02	255.50	108.10	121.05	108.50	337.65
271-300,	11	6.51	285.09	93.91	93.56	84.27	271.74
301-330,	6	3.55	315.50	88.33	129.00	107.67	325.00
331-360,	1	.59	359.00	45.00	75.00	69.00	189.00
476,	1	.59	476.00	27.00	155.00	126.00	308.00
1,100,	1	.59	1,110.00	....	....	3.00	3.00
241-1,110,	42	24.85	299.88	95.55	111.81	99.00	306.36
Total,	169	100.00	231.08	136.92	124.48	109.18	370.57

Table V. Table giving the egg yield for three years of 169 fowls in groups according to the age at which they laid their first egg.

The age at which pullets lay their first eggs is a very safe guide in making our first selection for high producers. Here is the result of actual trap-nest records of 169 hens. This table is so arranged that we find over here to the left the groups according to age in days when they laid their first egg. The first group laid when they were 151 to 180 days old, and each of the other groups are 30 days older; for example, 181 to 210 days, 211 to 240 days, or just a month older for each group. You can easily remember how one group differs from the other by 30 days. There were 4 in the first group, 71 in the second, 52 in the third group, and so on, and when the three first groups are assembled they averaged to lay when they were 151 to 240 days or 8 months old, and include 127 birds out of 169. Now the balance of them, the other 42, laid when they were 241 to 270 days old; and so on down to the smaller birds in the groups. The next column shows the average age when the first egg was laid, 176 days, 199 days, 222 days; or an average of 208 days old for that group of 75% of the birds. Do you get the point, that out of 169 birds, 75% of them, ¾ of the birds, had begun to lay when they were an average of 208 days old. Now the average production for these birds the earliest to begin to lay for the first year, for the second year, for the third year and for the three years combined, is as follows: The first group, 173 eggs the first year, 135 the second year, 126 the third year, or a total of 434 eggs in three years. Those that began a month later, laid in the order of 157 eggs the first year, 133 eggs the second year, 116 eggs the third year, a total of 407. Those that began a month later, that is, two months later than the first group, laid 140, 121, 106 eggs per year respectively, a total of 367 eggs. Now the 75% of these birds averaged to lay 150, 128, 112 per year, or a total of 391 eggs in three years. Let us take all these birds that did not begin to lay until after that age, the older groups, and you see what a sudden dropping off in production there is of that group, that did not begin to lay until they were an average of 255 days old; they laid in the order of 108, 121 and 108 eggs. Those that were in this later group, laid a month later; 93 the first year, 94 the second year and 93 the third year, and so on down. We have an average total of 370 eggs for the early producers as against 306 for the late. In other words, we find that the birds that laid by the time they were 8 months old, as a rule, are likely to be high producers, whereas those that do not lay until after that time are likely to be low producers.

THE INTENSITY OF EGG PRODUCTION AS AN INDICATION OF PROLIFICACY.*

Leg Band No.	1st Year.		2nd Year.		3rd Year.		Total eggs laid in 3 years.
	No. days continuous laying.	No. eggs laid.	No. days continuous laying.	No. eggs laid.	No. days continuous laying.	No. eggs laid.	
5697,	15	243	5	162	6	146	551
7518,	5	221	8	163	4	109	493
7880,	5	151	28	145	12	159	459
5675,	3	148	5	136	6	155	439
7700,	3	152	5	135	6	141	428
5708,	5	151	12	142	12	133	426
7675,	6	140	7	149	9	131	420
5633,	4	159	4	114	3	133	406
7897,	5	137	11	424	6	139	400
7455,	8	138	9	107	13	105	350
7469,	8	118	11	104	6	124	346
7668,	6	106	21	101	12	114	321
7860,	7	106	7	72	6	58	236
7504,	6	83	8	86	6	57	226
7658,	2	45	2	53	2	65	163

*Fifteen Single Comb White Leghorns at Cornell University selected from sixty-three whose Records are known for three years or more.

Table VI. Table showing the yearly record of hens arranged according to the number of eggs that they laid continuously at any time during the year.

One of the theories that has been advanced in regard to the methods of picking out high producers has been to find the birds that lay most continuously without a skip. We have picked out 15 birds from the flock representing birds of continuous laying qualities. These birds have been arranged in the order of the eggs they laid during three years. (Table 6). The highest producing hen laid 551 eggs and so on down to 163 eggs in three years, the lowest producer in that lot. The various hens had the second of continuous laying without missing a day as follows: 15, 5, and 6 days and so on for the others. Here is a hen, 7880, that laid 28 days without skipping a day, and laid 459 eggs in three years. Here is a hen that had a record of never having laid over two days consecutively and she gave us 65 eggs each year or a total of 163 in three years time. We have a record of one hen that only laid 3 eggs in three years time and did not lay these until toward the end of the third year.

I see that my time is getting away and that Brother Wittman is going to be crowded off the program if I do not hasten. In Fig. 17 is a picture of a hen that gave us our first clue in 1906 to the idea that the way a hen moults in the fall is an indication of her laying capacity. The late moulting of hens give us the second method of picking our birds as high producers. Let us review the steps. The first thing to do is select for vigor, the second is to pick out the early laying pullets; the third is to watch these selected pullets in the following fall of the year to find out whether or not they moult late and lay late. Late moulting is an indication of late laying. This bird (Fig. 17) laid us 200 eggs between January 24 and October 12th, when this picture was taken. The next slide, Fig. 18, shows that same bird in full moulting condition. You will notice that she has a perfect egg type, a body deep from the back to the keel, deep from the back to the abdomen, good, heavy shanks, set wide apart; well developed head, large, vigorous body. This slide shows the hen taken the last of November when she had completed her record of 216 eggs for the year, and at that time was the highest producing bird we had. This picture was taken a few days after she was at her worst; she had begun to get her new plumage but she gave the key to the whole situation as to that factor as a means of indicating production. There is a picture of Cornell Supreme (Fig. 19), the best hen we have ever discovered. That picture was taken the 6th of December. We find that every one of our phenomenally high producing hens those that lay around 200 eggs or more a year, are birds that do not moult until in November and December, and yet all these years we must confess that until these facts were brought out, we have been inclined to kill the hens that moulted late, just because they committed the crime of laying too many eggs. We thought that if hens moulted late, they would not lay early in the fall. The fact is that those hens that moult late begin to lay more quickly, frequently, than the poor producing hen that moult in July, August or September.

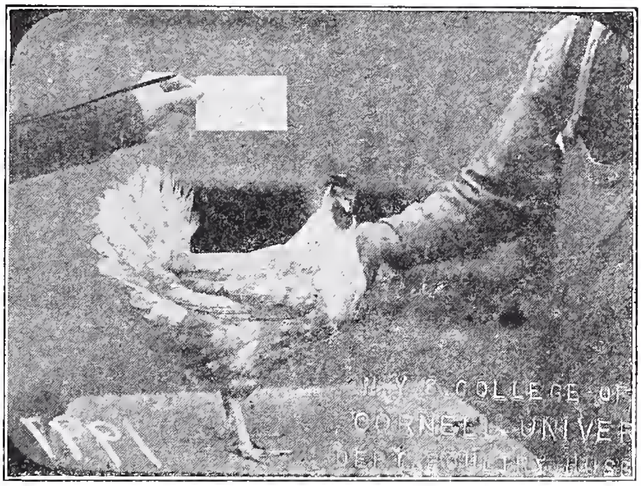


Fig. 17. Hen No. 61. An individual that gave the first clue to the factor of late molting as an indication of late laying and high production. Observe the fine egg type of a high producer

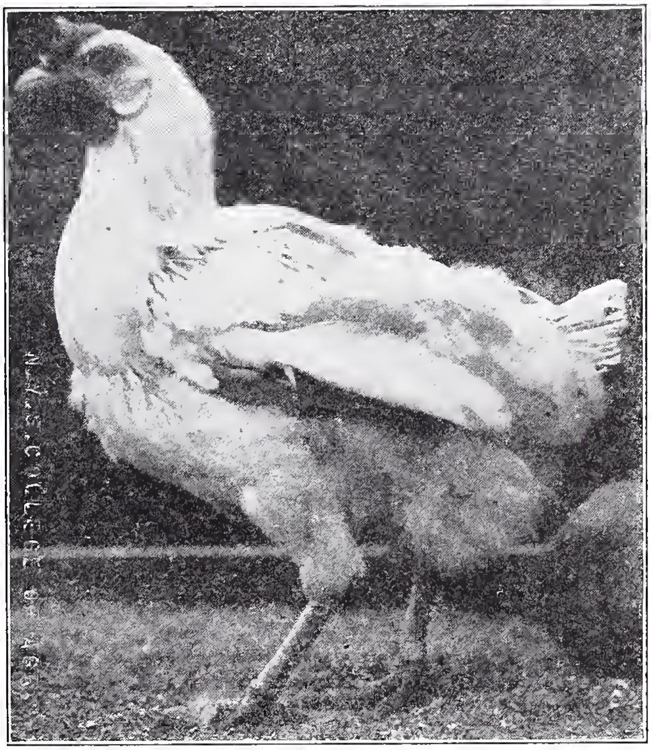


Fig. 18. Hen No. 61 in full molt just growing a new coat in the latter part of November.

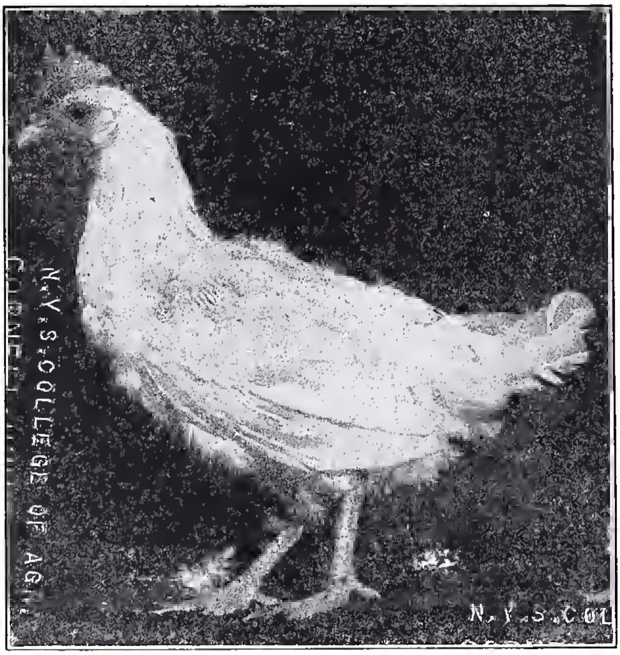


Fig. 19. Cornell Supreme in full molt, December 6th.

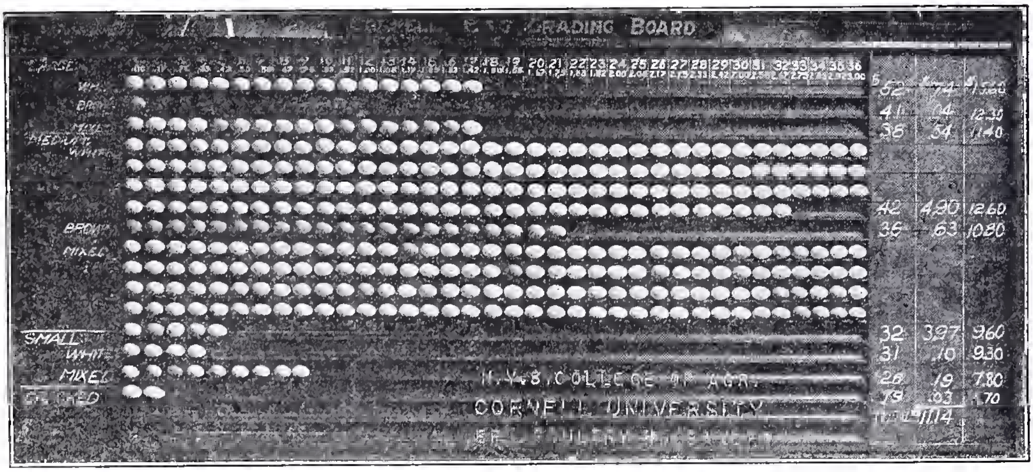


Fig. 20. The Cornell egg distributing board, showing a 30 dozen case of eggs of various grades to indicate the value of each grade and the total value of a case if all eggs were of any particular grade.

There are three distinct external characters that we have found and have tested out and therefore know will work, all of which can be put into practice without ever using a trap-nest. Now get these points clear. First, always pick out the hens that are vigorous and healthy; second, pick out those hens that moult late; and third, pick out the hens that have pale shanks; fourth, pick out the hens that have smooth texture to their combs late in the fall of the year.

Our Mr. Kent and two helpers, examined a thousand hens or more, whose records are known for a period of years. They examined them and made a record, first, as to whether they were moulting early or late; whether their shanks were very pale or very high color or anywhere between; whether the texture of the comb was soft and pliable or whether it was dry and hard; and they put those three characters together in the order of one, two, three, four, five in grades, from the highest to the lowest, that is to say, if a bird was all feathered out new, she counted as five because she was an early moulter; if she was all ragged at that time in October, she counted as *"one"* because she was perfect, a perfectly late moulter, or a hen might be anywhere between an early and a late moulter, one, two, three, four, five. They made the test as regards color of shanks, and texture of comb, and then added those figures up for each bird and, without knowing the records of the birds, because they were down in the office. They simply adding up the score of each one of those birds, based on that arbitrary mathematical figure of proportion of those three characters, and could tell with a great deal of accuracy whether these birds were high producers or low producers. They did this with all the hens that were trapnested simply for the purpose of ascertaining the facts.

Every farmer can take those visible characters with certain caution always in mind to guard against error in judgment. First always consider constitutional vigor of the bird—she may have pale shanks because she is sick, she may moult late because she is unwell and cannot shed her coat, she may have a dry comb because she is ill; the first thing to decide is that she must have constitutional vigor. Having satisfied that, then find out whether she is an early, medium or late moulter. Pick the late moulter. The third is, look at the color of the shanks. If they are pale, it indicates that she has laid the color out of her shanks. If they are high colored, it shows that she has been loafing around doing nothing but boarding on you and you are keeping her for the sake of her society. We have found some of the finest looking birds in our flock, beautifully plumed, their plumage shining and their combs red and their shanks as yellow as could be found that hardly laid fifty eggs a year. The fowls having soft, pliable combs are in a laying condition.

PRICES PER DOZEN FOR EGGS IN LEADING CITIES, NOVEMBER, 1910.

Grades.	New York.	Philadelphia.	Boston.	Chicago.	Average.
Large.					
Whites I,	.52	.35	.46	.35	.41
Browns II,	.41½	.36⅓	.46	.35	.39
Mixed III,	.37½	.32	.46	.33	.36
Medium.					
Whites IV,	.42½	.34	.43	.32	.36½
Browns V,	.35⅓	.32	.43	.32	.35
Mixed VI,	.32	.32⅓	.43	.30⅓	.32½
Small.					
Whites VII,	.31	.26	.30	.29	.27
Browns VIII,	.28½	.25	.30	.29	.26½
Mixed IX,	.21½	.28	.25	.28	.24½
Miscellaneous X,	.19½	....	.17	.19	.16½

Table VII. Table showing the price per dozen for various grades of eggs in four principle markets of the United States, showing the great contrast in price due to size, shape and color.

Just a word now in regard to the quality of eggs. Breed for quality. In Table 7 are the prices that we secured by writing to large dealers in New York, Philadelphia, Boston and Chicago, and get the average of those four cities for eggs that were large, medium and small, and among each of those three groups based on size, whites, browns and mixed colors, so that we have 9 groups of eggs, large, medium, small, and white, brown and mixed colors of each size, and here are the prices in New York. The prices were taken in November, 1910, and the same thing would be essentially true this year, or perhaps—a little lower—large white, 52 cents; large browns, 41½ cents; mixed colors, 37½ cents; and yet they are all large, all weigh two ounces and a quarter or more, just the difference in color; all of equal freshness, all of the same candling quality in every way, except the mere matter as to whether these eggs were white, brown or mixed colors. Then come the medium eggs, that would weigh under two ounces, but approximately that; white, 42½ cents;—still more than the large browns; the browns, 35½ cents; mixed colors, 32 cents. For small eggs, the white ones, 31 cents; the browns 28 cents and the mixed colors 21½ cents. Now coming to the average of all three cities, we find the large whites, 41 cents; large browns, 39 cents; large mixed, 36 cents; mediums, whites, 36½ cents; browns, 35 cents; mixed, 32½ cents. Of the small ones, whites, 27 cents; browns, 26½ cents; mixed, 24½ cents, and extreme difference of 24½ cents as compared with 41 cents.

A Member: You speak of freshness; how old has an egg to be until it is not fresh?

PROF. RICE: Well, sir, that depends upon the season of the year and how collected. Eggs can be gathered once or twice a day, taken directly from the nest, carried immediately to a cool place, having fresh clean air, where they cannot evaporate, and may be kept there for a week's time and no one would ever recognize the

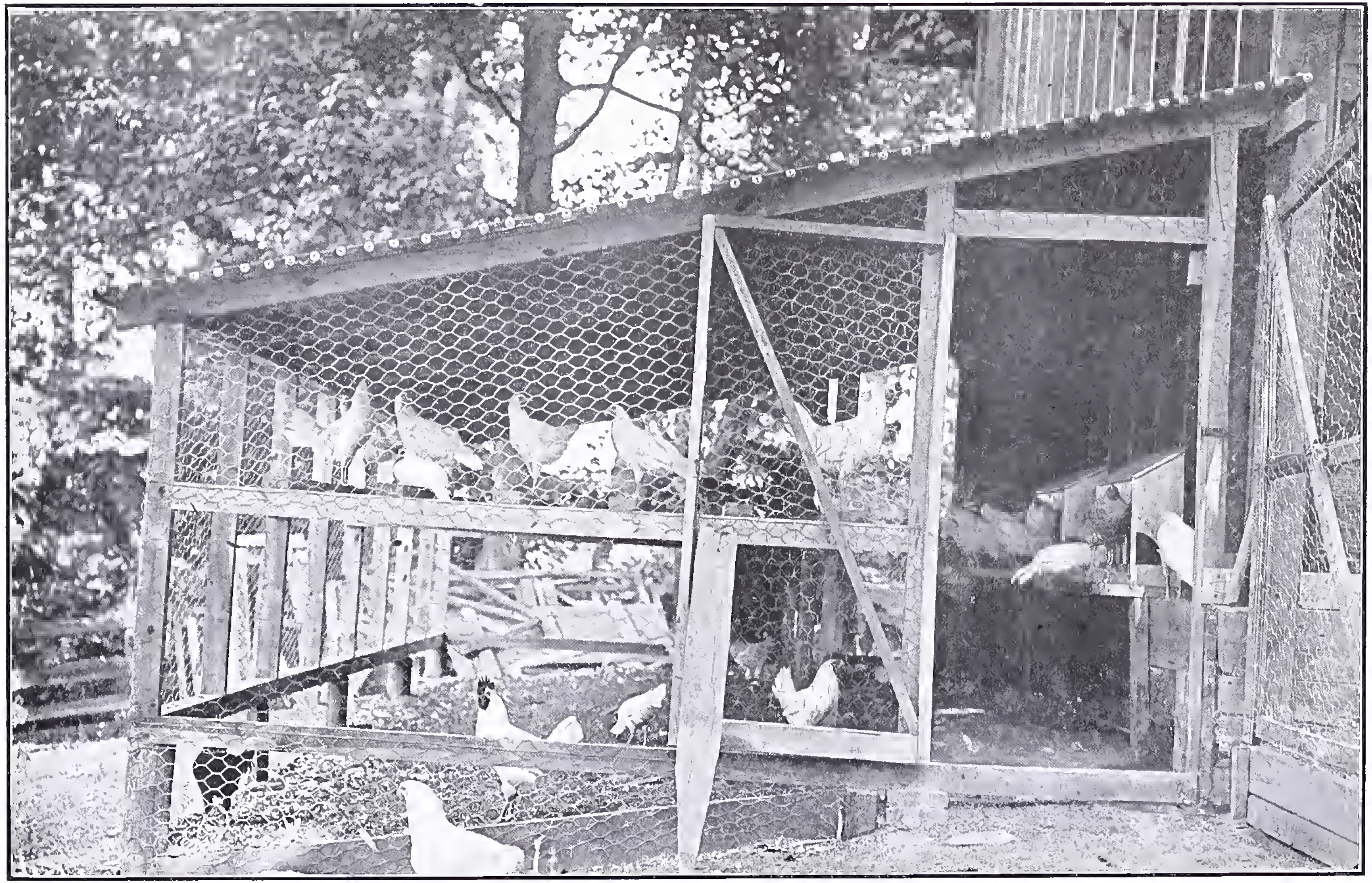


Fig. 21. An open shelter for the breeding males during the hot weather season, when males should be separated from the breeding flock to prevent fertilization of eggs and insure better keeping quality.

difference in the egg and those newly laid. On the other hand, if those eggs were left in the nest or in a hot room, they would deteriorate more in 48 hours than they would in a week under ordinary, desirable cool conditions.

A Member: How about it if they were put in liquid glass?

PROF. RICE: That seals the pores and they retain their quality so far as evaporation is concerned all right but lose a little in flavor if they are kept for many months, but they are all right for almost all cooking purposes.

A Member: What is the difference in quality between an egg kept in cold storage and one kept in liquid glass, both for the same period?

PROF. RICE: The egg kept in cold storage frequently suffers on account of fungii entering the shell. There are several fungii the spores of which if the air is damp that can get through the shell of an egg in cold storage especially that affect the flavor and appearance of the egg but that cannot penetrate it at all in water glass. Water glass simply preserves the egg in the condition it was by keeping the germs from getting inside.

A Member: What is the difference between an egg that is fertile and one that is unfertile, if any?

PROF. RICE: I do not know what the actual difference would be if a fertilized and unfertilized egg were immediately put under the same cold temperature conditions. I do know that under ordinary care, the germinal spot of an egg that has been fertilized will begin to grow quickly, at a temperature of 70 degrees or about that temperature—and that is pretty low temperature too. It is living room temperature. When the chick begins to grow, the white patch due to cell divisions shows very quickly, and of course if the temperature is 90 degrees or near 100 degrees, as it is frequently on a hot day in a nest or in a kitchen that egg within 48 hours, would have a little white patch over the surface of it and might have a little red streak that would show to such an extent the egg would be unsalable, would disintegrate and go to pieces in cold storage. That is why the cold storage people would prefer to have February, March and April eggs, and keep them two or three months longer, than to put the eggs of June, July and August into cold storage. The liquid glass would not affect that situation due to fertilization at all; the liquid glass only affects the conditions that go through the pores of the eggs; the fertilization is affected by the temperature.

A Member: Exclusion of air has no effect on the progress of fertilization?

PROF. RICE: No, not at all, as far as I know; but you must get an egg cooled down quickly to at least 50 degrees or thereabouts to stop development.

A Member: Isn't it a fact that the Pennsylvania eggs which are going into cold storage in this State, or in other words, the egg that is going into cold storage in the State of Pennsylvania, is not a Pennsylvania egg, for the simple reason that the western egg is a better keeping egg? I cannot account for it by anything else except that a great many egg producers in the western states take the cockerels away from the hens.

PROF. RICE: Well, I want to say a word on that, because there is a great deal involved. I realize fully the importance of keeping the males away from the hens during the hot weather season; but I am not in sympathy, most decidedly not in sympathy with the slogan unqualified to "Swat the rooster," that is heralded all over the South, although undoubtedly it is more important for them than for us, because we have less length of hot weather season than they have. They mean all right in trying to keep the males away from the hens, that should be done even in this State, and New York State or anywhere; but the slogan of "Swat the rooster" results in the killing of thousands and hundreds of thousands of roosters all over the country that should not be killed and is defeating one of the most important ends of good breeding. They are forcing the breeders to depend upon the young and frequently immature males for all of their mating and they are killing all the fine males that prove to be desirable at the end of that first season, or the second season. How many of our males that have stood all of the tests of the most rigid selection as cockerels, break down in the second year? And then how many fall by the wayside in the third and fourth years? When you can find an individual that has stood up through all these breeding seasons and still has virility and vitality, that bird is a bird in a thousand, and we cannot afford to sacrifice him. What would become of the beef or the dairy and horse interests of this country if they depended upon yearlings or two year olds for breeders every year? The principle is dead wrong to kill off the males each year. We must keep our best males just as long as they retain their vitality. We must find a way to take care of them during the breeding season and after the breeding season so they will not suffer in vitality.

A Member: Do you use that male on his own flock the following year, for two or three years?

PROF. RICE: I think that question has never been very well worked out, as to how long it is safe to breed the same sire upon his own offspring, yet my opinion is that the tendency of close in-breeding has the effect of reducing longevity by killing off the males that ought to be kept on their farms for breeding for a period of years. I tell you, friends, when you get a male that is good enough *to breed from*, he is one in a hundred perhaps, one in five thousand. If you never have gone through the experience of reducing 100 males by the rigid process of elimination of the poorest down to the two or three best, you have never gotten your full education.

A Member: Isn't it a fact that the male you describe is no longer a rooster, but that he is a breeding animal?

PROF. RICE: Yes sir. He is a breeding animal, but he is also a rooster. If they could only make the distinction between good roosters and poor roosters it would be all right. I am not saying this in criticism, Mr. Wittman, I am saying though, that the way in which the "Swat the rooster" campaign is promulgated through the country gives the farmer the impression that he should kill every rooster in sight. Now that is not right. I would rather have a male that is two or three or four years old and equal in vitality as he frequently is than I would a cockerel of the same variety; you know just as well as I do, men who have had much experience in selecting males, that you may pick five males out of a hundred and breed them for one season and find that several of them have lost their vitality and virilty. I know that you can in-breed and retain vitality and you can in-breed for high vitality and increase it, but I believe that the tendency of mating together close relationship is wrong and we ought to get outside of our own lines occasionally, but I also want to say that more people make the mistake of trying to get new blood into their flocks every year just because of the supposed desirability of new blood, than the people who stay pretty largely within their own lines. We never can make permanent progress in improving the quality of our eggs or the number of eggs laid if we are going to get somebody else's males or females into our flock every year or two. The chances are that we may reduce our vitality, we may reduce our general quality—we may reduce both the number of eggs and the quality of the eggs by so doing. What we want to do is to find some person in our neighborhood who is doing the same kind of breeding we are and then exchange the best birds with him. Let him pick these from your flock and you pick the best from his.

In Fig. 20 is seen how a 30 dozen case of eggs looks picked up in the country at random and graded according to the three sizes, three colors, as indicated in the previous slide, then figured up at the following prices for each of those grades. That particular case of eggs, under those circumstances, would have been worth $11.14 at the prices quoted for each grade separately and sold at the grade price. If, however, that 30 dozen case of eggs had all been of the first grade, large and white, it would have sold for $15.60 instead of $11.14. If, however, that whole case of eggs had been of this small, mixed color eggs, it would have sold for $7.80, instead of $11.14. When one can make a difference of 5 cents to 10 cents a dozen in the price of the eggs and a hen lays 10 to 12 dozens eggs a year, you can see for yourself that five times eleven is 55 cents, gross income per hen due purely to the quality of the egg she lays.

The figures show an important principle in selecting eggs for hatching; if we are going to get eggs that are of large size we must use the same kind of an egg for hatching. If we expect to get birds of good size, we must use large eggs for hatching, assuming that we have the same breed under consideration. Here is the way it will will work (Table 8.) Here are eggs that were selected as small eggs; they weighed 1.66 ounces; here were eggs selected from the same flock that weighed 1.90 ounces; here were large eggs that weighed 2.35 ounces; now then, at the end of the time when those chickens were hatched, the eggs were in the proportion of 100 to 114 and 141. Assuming the first ones as one hundred, then these were 114 and these were 141 in size. This is at the time of hatching. Now here is the weight of the chickens when they were 20 weeks old; 1.87, 2.29, 2.65; and here is the proportion which you can compare with that; 100, 122, 142. There are the actual weights of the eggs out of which the chickens hatched. Here is the weight of the chickens from each of those groups, 20 weeks old, and here is the proportion; in other words, one hundred is to 141 as one hundred is to 142; in other words, the size of a chicken of any given variety is in the proportion of the egg out of which it was hatched. If you want to get a large sized chicken, pick the good sized eggs to get a good sized chicken to lay a good sized egg to hatch a good sized chicken.

WEIGHT OF EGG TO WEIGHT OF CHICKEN.

Eggs.	Average weight of eggs.	Per cent. weight.	Average weight chicken 20 weeks old.	Per cent. weight.
Small,	1.66 oz.	100	1.87 lb.	100
Medium,	1.90 oz.	114	2.29 lb.	122
Large,	2.35 oz.	141	2.65 lb.	142

Table 8. Table showing the exact weights of eggs and of chicks indicating the fact that the size of the egg of any given breed determines the size of the chick.

Fig. 21 is just a suggestion for keeping males cool and away from the hens during the summer time. It means that there must be a wire covered place that could be locked up so that the chickens could go in and out; on the north side of some building where it is cool, comfortable and congenial, with a large number of feeding hoppers and watering devices, both inside and out of the building so that the strong males cannot fight the others. The great difficulty of keeping many males together is in making them all go to eat or drink out of the same places. If they are scattered all through the woods, with plenty of room to range and lots of room in a building where they can get away from each other, it is not so difficult to take care of them for that length of time, and I think we owe it to our stock to keep our best males rather than to kill them; but if we were to "swat" all the rest of them, it would certainly be a great blessing to the community.

Finally, and lastly, we want to bring out the fact of good care of our birds during the winter if we are going to get the best results in breeding. No amount of good breeding will ever take the place of poor ventilation of our hen houses or poor care of our hens, and while it will not be possible to speak of these things in detail here, I want to point out for a moment a new idea, at least new to us, a method of ventilation to take the place of the muslin curtain in certain parts of the United States. I do not know that it would have application in the south but it certainly does in the north. This is a wind buffler, not an ordinary shutter, but a combination of louvers placed at different angles to prevent the snow, wind and rain from blowing into the house and for allowing the air to change freely through the house without draft. In Fig. 22 is shown a building that we used for two

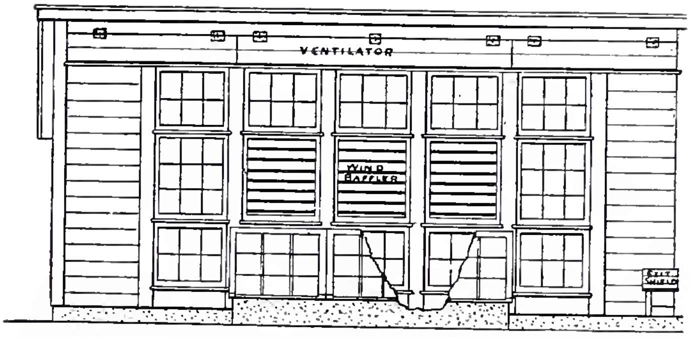
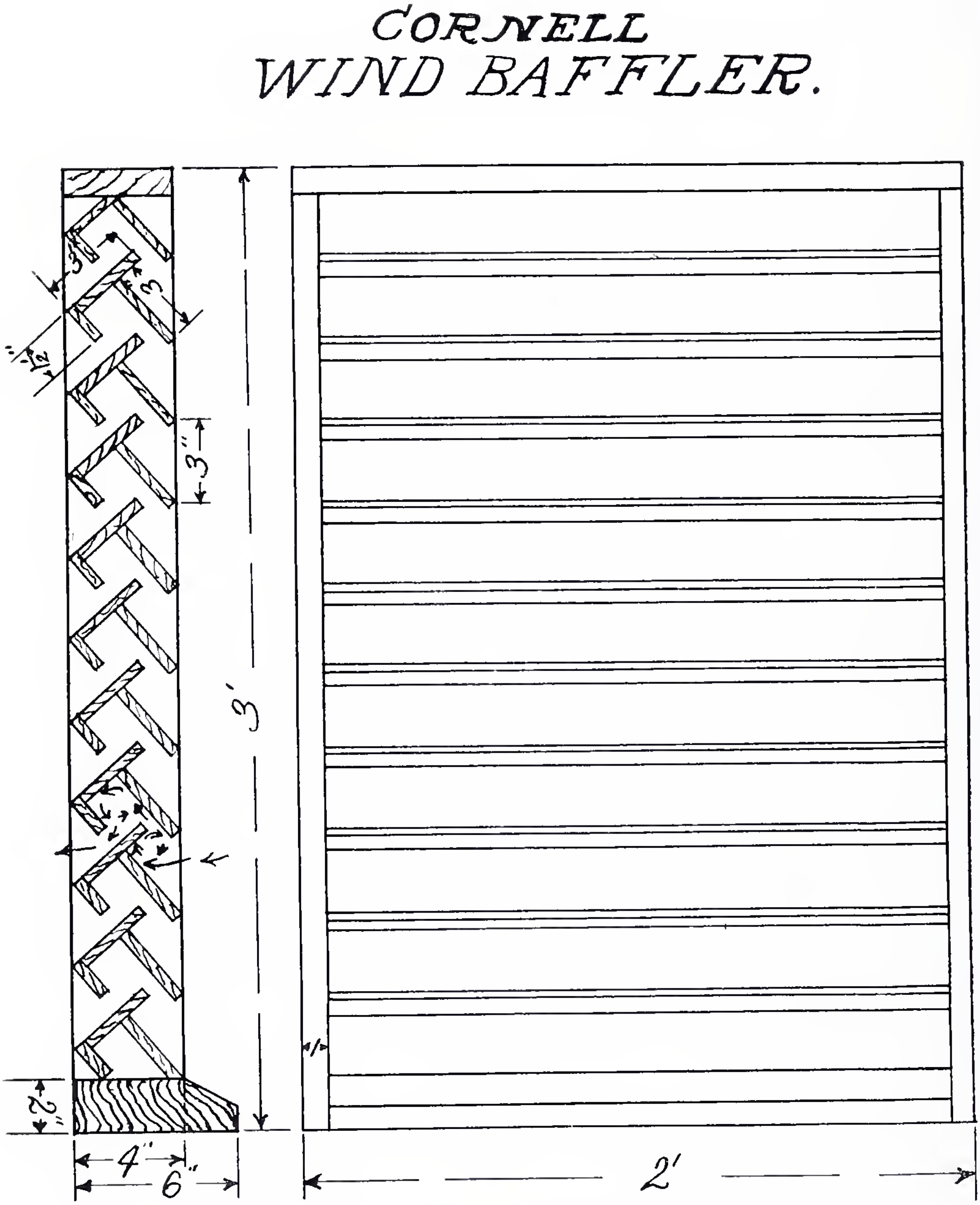


Fig. 22. The front of a modern poultry house designed by Cornell University to show the use of the wind baffler and a larger proportion of glass to insure greater warmth, dryness, sunshine and fresh air.



Arrows show how wind whirls when passing through the baffler.

Fig. 23. Working detail drawing showing the construction, front and cross section, view of the Cornell wind baffler which effectually provides for free circulation of air without drafts.

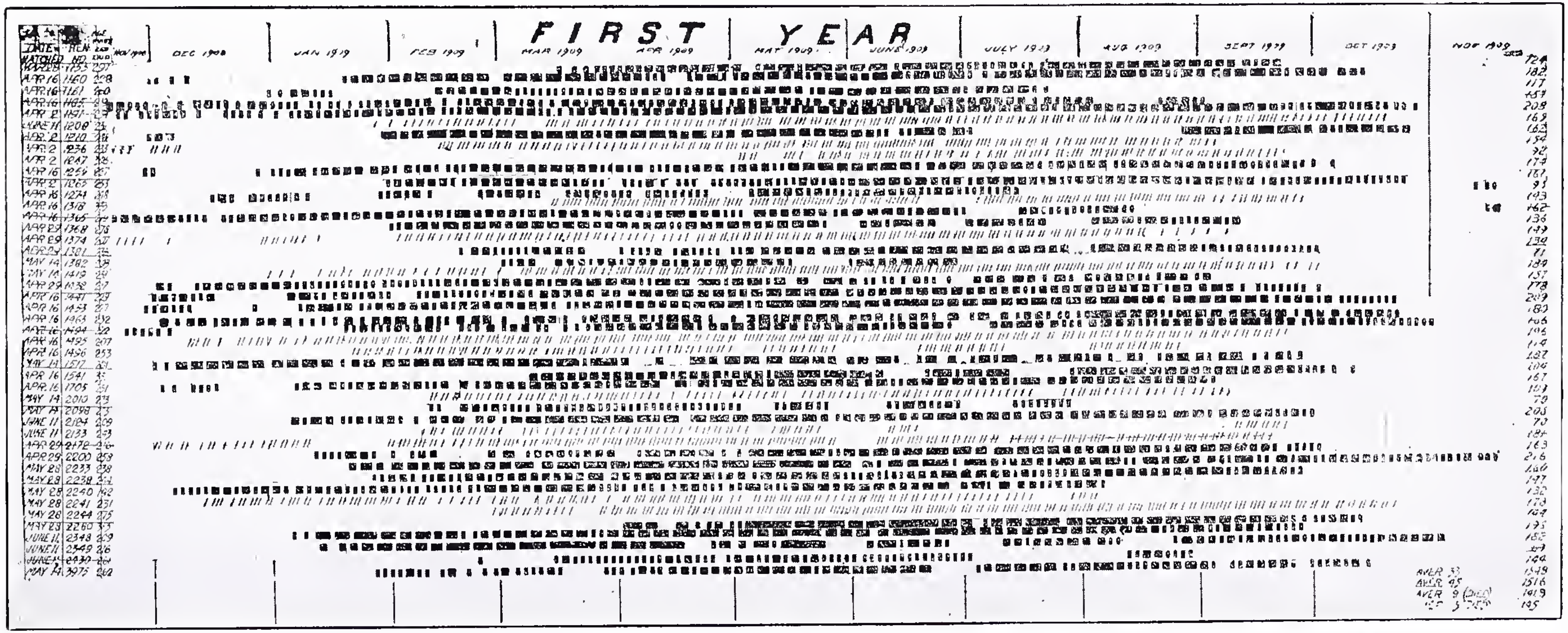


Fig. 24. The first year production of 45 hens, showing the days that they laid and the days that they did not lay each day of the year. Observe how the production increased after the month of December and ceased after the month of September in the case of most of the fowls. It will be seen that usually the birds that began earliest to lay continued to lay latest the following year.

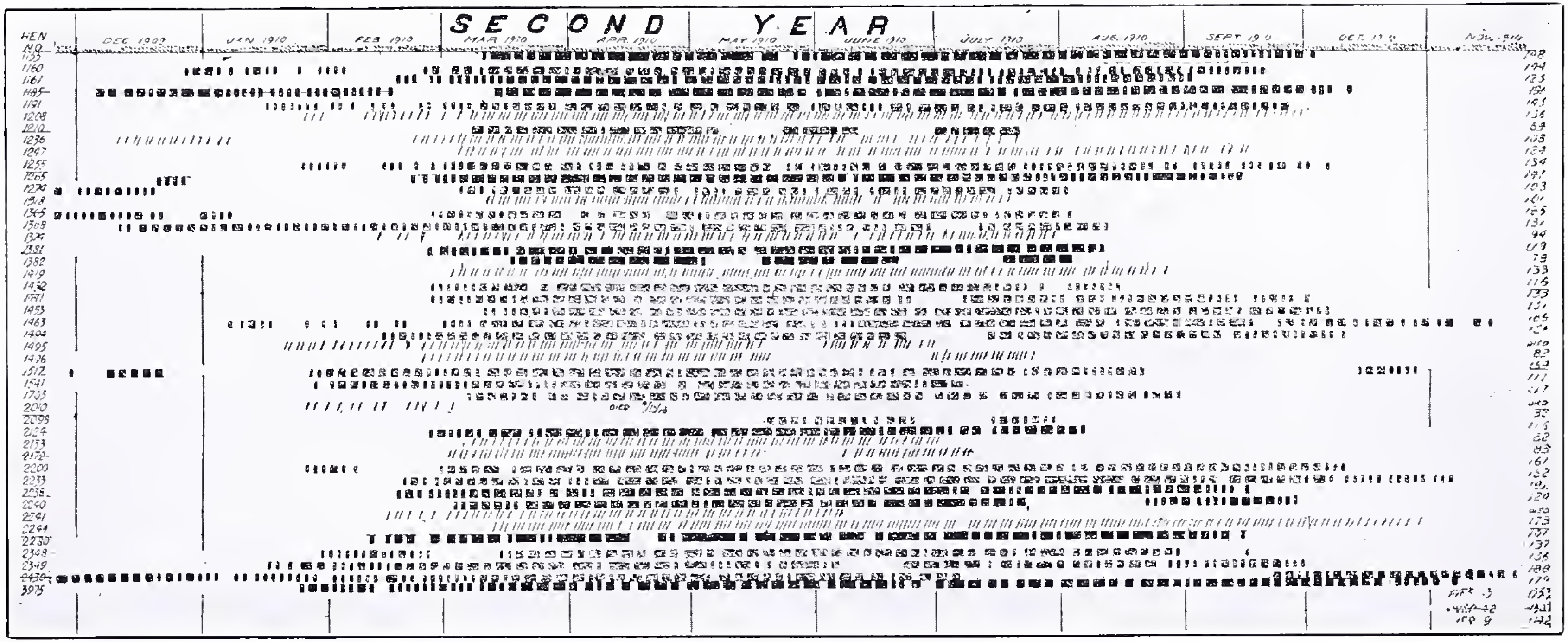


Fig. 25. The daily production of the same 38 hens shown in Figure 24. Observe how much later the birds began to lay, as a rule, in the second year and how much earlier they ceased laying at the end of the year.

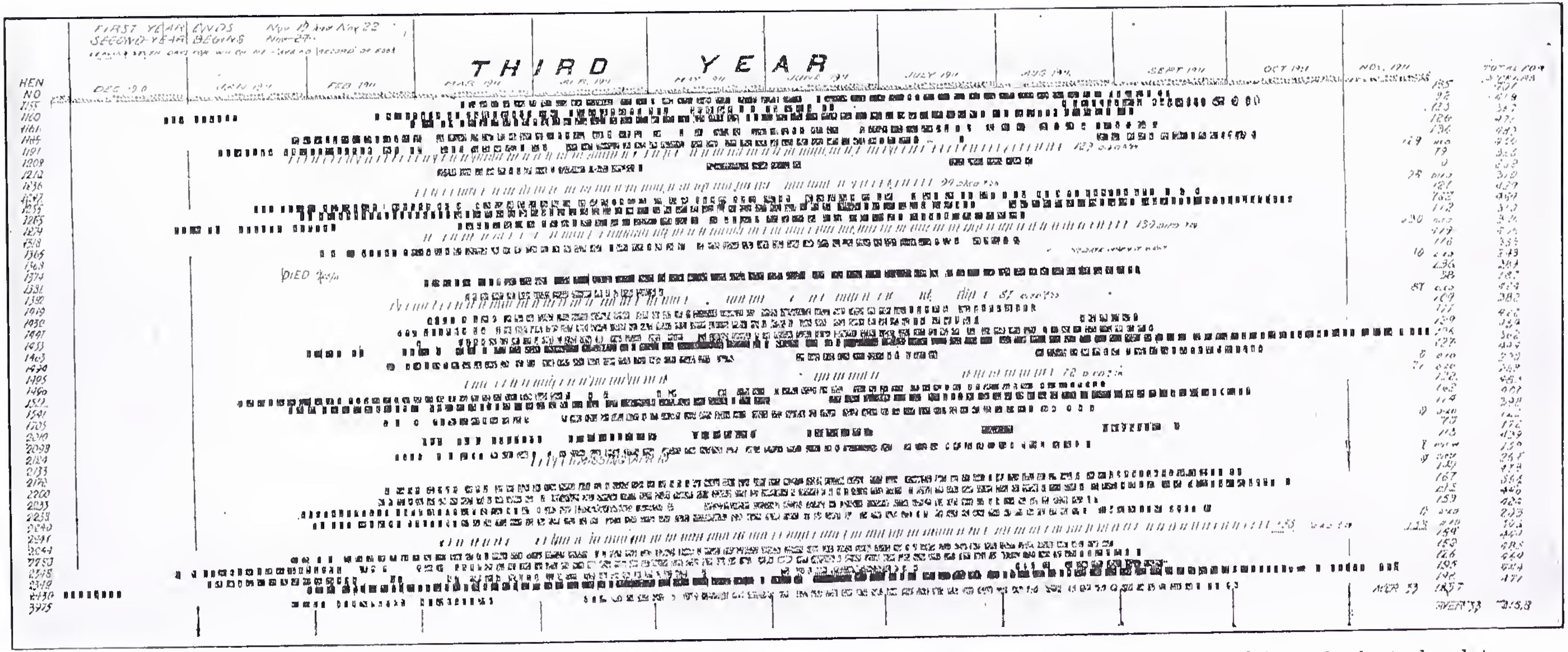


Fig. 26. Third year production of the hens shown in Figures 24 and 25. Note a still greater tendency for the birds to begin to lay later in the fall or winter and cease to lay earlier the following fall; whereas, the production in each of the years maintains nearly the same intensity during the months f March, April, May and June. Note also the difference in the length of the periods when hens lay continuously without skip. Usually this is in the case of the better producing individuals, but not always.

years to test out the efficiency of these wind bufflers. There is a little more glass put in the house to make up for the darker effect of the wind buffler in place of muslin. This picture (Fig. 23) gives a little better idea of the wind buffler, cut right down through to show the arrangement of baffle plates. You can see what the principle is; the wind, blowing from the front of the house, comes up and strikes that louver there and whirls, it comes up in here and whirls around over here and makes a counter-whirl so that it cannot get into this house until it has turned over several times and then reversed itself in the other direction. A person can stand two feet behind this wind buffler in the house with a heavy head of wind coming from the south and never know that the wind is blowing. The snow cannot get in, the rain cannot get in, but the air can change place through all the half inch or three quarters. The air circulates more freely than where muslin curtains are used; and that enables a person to put these wind baffles in the front of his house without ever having to touch them from fall to winter, and your hens are never in a draft and always have perfectly clean, fresh air if the proper proportion of the front of the house has the wind baffler construction. I know very well that I have long since exhausted your patience. I ought not to have brought so many lantern slides with me nor talked so long to each slide. I apologize, and thank you very sincerely for your attention.

MR. CAMPBELL: We have tried to arrange a little entertainment for the afternoon, weather permitting, and at two o'clock promptly the machines will be at the Hotel Conneaut to take the delegates out to Mr. Holcomb's farm, a mile or a little more south of here, and we want you all to go. We have not been able to get enough machines to take you all at once, and the machines may have to make several trips, but be ready to go when the machines are there and at four o'clock the Conneaut Lake Navigation Co. will have their steamer at the dock to take you on a trip around the Lake. Remember the time, because the boat will be there and you will have to start promptly in order to get back and be ready for supper. Any delegates can get badges here if they haven't got them.

A Member: How about submarines?

MR. CAMPBELL: We are the mine sweepers, we are taking the mines out and we are doing our best to insure your lives. You will have to take chances.

The CHAIRMAN: The next speaker will be Mr. W. Theo Wittman, who will speak on "Forty Popular Varieties of Poultry."

Mr. Wittman's address is as follows:

FORTY POPULAR VARIETIES OF POULTRY

W. THEO. WITTMAN, *Allentown, Pa.*

Mr. Chairman, Ladies and Gentlemen: I am not at all disappointed nor do I feel at all bad that Prof. Rice has taken so much time. We poultry people at least give credit to Prof. Rice's standing head and shoulders above everybody else in this country in his knowledge of poultry, and I am particularly pleased that he has had the chance to give us all or at least part of what he knows here this morning. I am especially pleased that he has given us agricultural workers of this State a message to take back home that the farmers of the State of Pennsylvania should quit having so many late hatched chickens. You know quite a number of farmers in Pennsylvania are just beginning to think of setting hens or just beginning to have their first chickens, and here it is nearly June 1. I am very glad that he has shown us here on this screen that 60 eggs is a very low egg yield, and I am sorry that the farmers of the State of Pennsylvania showed in the census enumeration of 1910 that their hens laid only 68 eggs. Take that message back home so that in 1920 the farmers can give a better report to the census enumerators. I am especially pleased that he brought the message. We want pure bred chickens, and it is a shame that in Pennsylvania some of our fine farms are disfigured and brought down in mine and everybody else's estimation by the sort of mongrel chickens they have on their farms. I am very glad he has said this and a great many other things, and I hope that we agricultural workers will go home and be a nucleus in our own neighborhood and will set an example and that we ourselves will not have hatched mongrel chickens and will not kill the early moulters and things like that.

This morning I am going to try to tell you which is the best chicken. Those of you who heard me talk know that I have always evaded that question, for a good many reasons, First of all, perhaps, because of my position as a worker, knowing the prejudices a great many people have on a particular question. As an officer of the American Poultry Association, I have tried to be as loyal to their standard as I could. I have evaded the question perhaps, because I am a licensed poultry killer and because I am manager of one of the largest poultry shows in America. But this morning I am going to try and forget all that, and directly and individually, as I feel to-day, tell which is the best chicken or which is the best variety of poultry to keep; or, rather, I am going to try to help you so that you can tell which is the best.

Now we are going to show some slides, not very many. The program says "Forty Varieties of Poultry." I'm going to tell you, "Forty Varieties" came about something like this: Several years back the American Poultry Association for the first time voted quite a large sum of money that the different forty most popular varieties of poultry might be shown in lantern slides. It seemed to be very hard to find some firm that could make those pictures. Then the cry went up as to which were to be the forty. So a little later the American Poultry Association decided that all the standard varieties, something over a hundred, were to be shown like this. At last they are ready to do this. We have tried all the big slide makers of the United States, and you are going to see on the screen here this morning slides made by Williams, Brown and Earle, of Philadelphia and the Horace MacFarland Co., of Harrisburg. You are going to see some slides made by firms in Chicago, Boston and New York, and this is the very best they could do. I am sorry to say they are not up to type; in other words, the new standard, the 1915 standard, containing the illustrations of the very latest types of chickens is not out, and on account of the copyright law, we cannot show the newer type until the book itself is in circulation; but we will be ready to do that by the time of the World's Fair in November—I mean the poultry show in November, and they will be shown there for the first time.

These pictures I am showing here this morning are samples. There are going to be two kinds of chickens here; you had a hint that there are going to be two kinds of Barred Rock. I am going to show, first of all, the standard types, the type that the chicken fancier is trying to get, the type that is winning in the show room, not only the type but the color, and here we have the most popular chicken in America so far as the farmer is concerned, or at least the chicken that was the most popular chicken on the farms of Pennsylvania, the Barred Plymouth Rock. The fancier of Barred Plymouth Rock has had one thing in view, to get a peculiar shade of color and have his male and female alike in color; if you will stop a moment, you will remember that your males are a good deal lighter in color than your females and there are very few that have the markings of these particular chickens. You will notice a bluish cast, the feathers are pure black and white but are so distributed that the effect is a bluish pink. There has been endless time, patience and money spent in developing these fancy points. We have men in America who are known the world over, our Hawkins' and our Thompson and our Bradley and Wells, men whose names practically everybody in the room has heard, that have spent their lifetime in developing this Barred Plymouth Rock and bringing out these fine lines, and they go down to Madison Square Garden and fight the old battle over year by year as to supremacy, to see who can bring birds with the most parallel bars. Those bars on those feathers had to be parallel, straight across, so that we can have these ringlet effects. Those who have not been poultry fanciers have no idea what is required along the breeding line to bring about something like this.

We want to give due credit to the men who have been able, as a result of spending a lifetime of the keenest sort of work to be able to show this sort of chicken. It is not easy. I have knocked around the show rooms pretty nearly all my life; I remember the very first chicken I showed, when I was only a boy of ten, but it was a mighty fine chicken, I thought. I paid a dollar to enter it in the poultry show, my own dollar too, and the judge came along and disqualified it; I didn't even have a run for my money, and when I was 17 somebody thought I knew enough about chickens to judge my first poultry shows and he went to the president of our county fair and got me a job and I appeared and introduced myself to the secretary and he asked me to repeat what I'd say; he was polite enough not to say anything more, but when I got out into the hall one of the men, when told I was to judge chickens, said, "That fellow is only a kid," and since that I have heard more than once that I don't know anything at all about chickens and I guess it is true, but I have been through that hard knock school of experience in judging poultry and I know what it is to get birds of this type.

Understand when men are breeding chickens, to get this type, they may have it on paper or they may tell it by word of mouth that this sort of chicken lays eggs, but they really don't care whether a hen like that lays one egg or a hundred, and they will breed her whether she does or not, and they will use the progeny from that sort of hen again and again, and it would be foolish if they didn't do it. A Barred Plymouth Rock like these, I have seen sold for $100, $200, $500 and $800, and if a chicken like that is worth $800 and lays only 8 or 9 eggs a year, her eggs are worth some money. But I am not quarreling with those fellows who claim that that is the sort of chicken the farmers and utility poultry men should have and sell their eggs from this sort of chicken to the farmer and men who try to make a living out of their chickens. Within a month I was with a city man whose health has broken down and he bought a Pennsylvania farm nine years ago. The girls are off at work, but the boy is 16 and is going to school. The father is trying to pay the mortgage and the mother and the boy are trying to help with chickens. Four years ago they bought some chickens from one of these chicken fanciers, these purely fancy chickens. He brought these chickens to his Pennsylvania farm; they are low in vitality, they have never paid, they have simply lost their money. Why, to my notion it is a crime for any man, for any chicken fancier to sell that sort of chicken to that sort of person. It is not fair, and I do wish the chicken fancier, much as I respect him—it is a profession that I belonged to for many years—I wish he would quit that, quit fooling our Pennsylvania farmers and our people who are trying to make good with their chickens.

Now notice the difference; this is a work-a-day hen, a Pennsylvania hen. This is the hen whose mother and grandmother and great-grandmother and great-great-grandmother has been bred for egg producing. This is a hen that laid 283 eggs. This is a hen that could not win in any poultry show in the United States. You can compare the two types; one is a show lady and the other a work lady; you see the difference; feathers is everything here; the ability to lay eggs is everything with the other hen. This man had only one thing in view, to see how beautiful, how exquisite he could get his chickens, and just as long as there are men and women that love the beautiful flowers and beautiful painting, just so long there will be men and women who will love the beautiful chickens and just so long will there be poultry fanciers, but most of us I am afraid want the other kind of hen.

There is quite a difference in type in these Barred Plymouth Rocks. The owner of this hen—and he is a Pennsylvania man and a well known breeder—will tell you if you ask him to describe in a word this chicken, he will tell you that she s a Leghornized Barred Plymouth Rock. That is his description. I think you all get what I am talking about. I fear that the chicken fancier has made of his Barred Plymouth Rock a member of the "pound" family; it is not usual to find in other types of Barred Plymouth Rock birds weighing 8 or 9 or 10 pounds, but if the Barred Plymouth Rock is to be a worker and a layer, it will have to be reduced something in weight. Now we have some White Leghorns. I was talking of Barred Plymouth Rocks and the emphasis we put on Barred Plymouth Rocks and how many men had been working at it, and the same is true of White Leghorns, only a New York man was able to outstrip everybody else and his name is known the world round, and to-day it is simply impossible to win anywhere in any poultry show in the United States of America unless you have this man's White Leghorn. A great many in the room know whom I am talking about. This man has had a wonderful income the last few years because he created this kind of chicken. This sort of chicken is the result of many, many years of very faithful and very enthusiastic labor, because he will talk chickens from morning to night and then some. He gave up a wonderful position so that he could devote all his time to chickens. He has given us this elegant, stylish, beautiful White Leghorn, and everybody who admires the beautiful, it seems to me, cannot help but admire that bird; everything is a curve; the beautiful head, the style, everything that we think is exquisite in chickens is embodied in that type of White Leghorn; but again I fear that this is not a workaday chicken; in fact I know it to be true, I know it to be a fact, that if you ask the man who produced this chicken why it is that his chickens lay so few eggs, when you get him down in a corner all by himself, why these chickens lay so few eggs, he will tell you that the original mother hen laid that sort of an egg.

Now we have a different kind of Leghorn in the last few years, and I am sorry she is not the Pennsylvania Leghorn and not the United States Leghorn either; she is an English Leghorn. Now I don't know why it is that the English Leghorns lay better than the American, but I guess they do; it seems to me they do. Every large commercial egg farm, if they don't have some English blood already or don't have their large flock English, are thinking of doing it, with one exception—I only know one large farm in Pennsylvania that does not want English Leghorns. If there is any reason why these English Leghorns lay better than our show type of American Leghorn, it is because of something we heard so much about this morning, vitality. I was in a large brood house in Pennsylvania where there were 12,000 chickens, 2,000 English White Leghorns, and I believe I would have undertaken the task of picking them out nearly to the last one as two year old chickens already. You can pick out the English White Leghorn. It never droops its wings, it is a strong, vigorous chicken. These chickens were grown on Pennsylvania soil; their parents were English Leghorns; they belong to a farm down in Lancaster county and were imported. They are five chickens that came very close to winning the last North American Egg Competition. They stood second. There were 50 or 60 of those chickens down on that farm, and it would be very difficult to get 100 chickens that yould each lay 200 eggs in some one year. I believe you could pick out a lot down there that were full sisters to those chickens. Every one laid considerably over 200 eggs. They are magnificent so far as vigor and vitality and ability to lay eggs is concerned. I don't know whether you think this is the prettiest, because I showed birds similar to the other five at the Pittsburgh Poultry Show, the largest in Pennsylvania, this last year. I mean the best attended. There was five of those birds there. There was a long aisle of this kind; there was 10 people looking at the other kind where there was one looking at this; in fact this aisle having this sort of White Leghorn, seemed to be deserted, but the aisle with the other five had a crowd, in fact finally the Superintendent of the show insisted that they be moved because they were blocking the aisle; and time and again people came to me and said that of the two the other was the prettiest. Now this is our idea, the chicken fancier's idea, of beauty, and we leave it to the audience to say which is the prettiest, the workaday or the show type of White Leghorn. There is a terrific difference between the two; we have almost a different variety of chicken; you would hardly think they were the same variety of chicken.

Now, because the time is short, I am going to hurry on to the next breed, the White Wyandotte. This is the show type of White Wyandotte. These are Pennsylvania chickens; they are not the present standards but will give you a pretty good idea of what the breed of White Wyandottes are. That is the trouble, the slide makers don't get all the details, because they don't know chickens; they should have put deep yellow legs on there. But anyhow, that is the show type of White Wyandottes. We want a very deep broad, blocky bird. These chickens are almost as broad as they are long. The breast is very full, very abundant. This White Wyandotte, if plucked, would have a blocky body. Notice the fine comb and the refinement of type that you see everywhere; that is the fancier's idea of what constitutes a White Wyandotte. Now let's have the other kind, the workaday White Wyandotte. Those of you who are interested in egg competitions, remember the late North American egg competition and that for once the White Wyandottes beat the Leghorns, and this is the sort they were; you will notice the long body; in fact they are Leghornized White Wyandottes. The editor of one of our farm papers said they were simply White Leghorns. That is not quite true, but it is almost true. They have the narrow back; you see what a difference, instead of that great big wide back they have a narrow back; in fact we again almost have a new breed. This is the workaday White Leghorn. It is up to you again to say which is the prettier.

It seems that the American Poultry Association up to this time has made their standard—well, if you will tell me who makes women's fashions, I will tell you who makes the American standard of perfection. I don't know; it is simply a fad or a fancy, a changing fad or fancy not based on anything solid or substantial. Sometimes the American standard of some certain variety is simply based on a fad of one man, one fancier. I shouldn't have any quarrel with that, it put more money in my pocket at a certain period than any other chance of making money I ever had, but I don't think it is quite fair, when we come to sell this kind of chicken to the man who wants to get dozens of eggs or pounds of meat.

Now we have the laying type of White Wyandotte in this chicken. Notice the very large, high comb on two or three of these hens, almost lop combs, they were so large they would drop over. I am proud of the fact that Pennsylvania poultry people have been exceedingly liberal the last year in giving up their good dollars to get these good layers, it didn't matter who owned the birds or where they came from. They got the best they could buy, and these chickens we are looking at are to-day on Pennsylvania poultry farms and have high records as layers.

We have here Rhode Islands Reds. Now when I said that the Barred Plymouth Rock was the most popular chicken on the farms of Pennsylvania, I am afraid that to-day this other breed is leading and is slowly but surely pushing the Barred Plymouth Rocks off the farms of Pennsylvania. I don't know why, except that perhaps this is a better chicken. I am only showing four varieties of chickens this morning; these four varieties practically cover what is really popular to-day in America, the Rocks, the Wyandottes, the Reds and the Leghorns. Take the Campfire—just two years ago everybody was buying Campfires. On one farm I visited this season, the five first prize Madison Garden winners are not found at all. The general public seems to have simmered down to these four varieties. The farmer seems to like this Red. I don't know why the Red is good except that the American Poultry Association has done less to spoil the Red as a utility bird than any other breed. The Barred Plymouth Rock, to get the colors I was showing you, we have three distinct breeds, a controlling and pullet line. A certain line of chickens we breed together, male and female, to give the female a certain shade and color and then bring the two together. The one big stumbling block in the way is to get this color, and the slide makers have not been able as yet to get the correct shade of color in Rhode Island Reds, but this gives you some approximate idea of what constitutes color in Rhode Island Reds, one even beautiful red color. Now let us have the workaday Rhode Island Red. There is quite a difference. You at once notice that the man breeding these chickens did not pay so much attention to color; it was the ability to lay eggs, and again you notice something outstanding in these five hens; what is it? Vitality. Don't those chickens look as if they were really alive? And they are. I have had the chance to watch them a great many times and look them over and they are that way on the Pennsylvania farms; they are alive from start to finish, and is there any wonder they are beating the others in laying eggs. The reason is because they are alive and because the men who own them have been careful to look after vitality and vigor, so far as breed is concerned. I intended to say a whole lot more about these different grades, but unless you want to ask a question or two, I shall stop right here.

I have given little hints of what the general public has found to be best, and you will be pretty nearly safe in following these four breeds and not getting outside of them if you want to get the best chickens.

The meeting then adjourned until 7.30 P. M.

Wednesday, May 26, 7.30 P. M.

Mr. Archie Billings in the Chair:—

The CHAIRMAN: The first thing on the program to-night is the quartet.

MR. KILLAM: By your permission, Mr. Chairman, I would like to present the report of the Resolutions Committee, before they vocalize very much; I don't think that vocalizing will be very entertaining to this crowd anyhow.

Mr. Killam then presented the following resolutions:

REPORT OF COMMITTEE ON RESOLUTIONS

RESOLVED, That we, the Resolution Committee, appointed at the Spring meeting of the Farmers' Annual Normal Institute, held at Exposition Park, Pa., May 25th to 27th inclusive, do this the 26th day of May, 1915, report as follows:

First, Your committee, at the call of the Chairman met at 10:30 A. M. at the Hotel Conneaut and desires to present the following resolutions:

RESOLVED, That we extend our sincere thanks and appreciation to Hon. James E. Reany, Hon. R. C. McMaster, Messrs. H. O. Holcomb, J. T. Campbell, W. F. Throop and others for kind and courteous treatment extended to us while in their midst, and commend the action of the State Board of Agriculture for selecting this beautiful park for the place of meeting.

RESOLVED, That we deplore the departure from this life of our honored co-worker, Mr. M. M. Naginey, of Milroy, Pa., who so faithfully carried on the Institute work in Mifflin county, and express our sincere sympathy to his bereaved family.

RESOLVED, That we express our appreciation for the efforts of Governor Brumbaugh, in conjunction with the last Legislature, for the interest taken in the Department of Agriculture and its appropriations; at the same time regretting that the finances of the State will not permit a larger appropriation, knowing, as we do, the necessity thereof for greater advancement of the Advisory Work and Farmers' Institutes now being carried on so efficiently throughout the State.

RESOLVED, That we commend the excellent work done by the retiring Secretary of Agriculture, the Hon. N. B. Critchfield, who has been foremost in the advancement of our work.

WHEREAS, Being mindful of the fact that for sixteen years, Hon. A. L. Martin has been at the head of the Farmers' Institute work of the Commonwealth, and because of his ability as an organizer, and his co-operation with all of the educational forces of the State, he has established and developed an institute system that is admittedly excelled by no other state in the Union.

THEREFORE BE IT RESOLVED, That we extend to him our sincere thanks and commend him for his excellent and fairminded discharge of his official duties.

B. F. KILLAM,
S. C. GEORGE,
W. F. BIDDLE,
WM. M. PATTON,
E. L. PHILLIPS,
J. E. HILDEBRANT,
L. W. LIGHTY,
Resolution Committee.

MR. KILLAM: There were some suggestions offered to the Committee but they didn't take them up and we thought maybe they would be disposed of in that resolution and report.

The CHAIRMAN: You have heard the reading of the resolutions. What is your pleasure in regard to the matter?

REV. B. M. POSTEN: I wish to present this resolution, which I have shown to several:

> "Realizing the important part real religion plays in the farmer's permanent success, therefore, be it resolved that the farmers of the State be urged to give greater consideration to the importance of the country church, and that the authorities of the different denominations be asked to give greater efficiency to the men who are asked to perform this task as pastors by giving them an agricultural education."

The CHAIRMAN: Do you wish to take action on the resolutions as read?

MR. KILLAM: I move you, Mr. Chairman, that that resolution be added as a part of the resolutions already read, and embodied therein.

Motion seconded and adopted.

MR. BLYHOLDER: I move the adoption of the resolutions, as a whole, as read by the Committee.

Motion seconded and adopted.

The CHAIRMAN: If there is nothing further, we will take up the regular program of the evening and will now listen to our quartet.

The quartet then sang "My Bonnie Lies Over the Ocean," which was received with applause.

The CHAIRMAN: Our first topic for this evening is "The Draft Breeds of Horses," by Dr. Carl W. Gay, of the University of Pennsylvania, Pa. It affords me much pleasure to introduce Dr. Gay who will address you.

Dr. Gay's paper is as follows:

THE DRAFT BREEDS OF HORSES

DR. CARL W. GAY, *University of Pennsylvania, Philadelphia, Pa.*

Ladies and Gentlemen: I am a little disappointed because the quartet didn't sing, "A Hot Time;" I believe that would be more appropriate than the song they rendered. We are having rather a cool reception to-night, and if you become too much congealed and will indicate that fact, I will close at any time.

You may wonder whether or not it is worth while to devote a place on this program to the discussion of horses. I don't know anything in the way of farm products at the present time about which there is any more question than the production of horses. I do not propose to take up the answer to that question, because we haven't time; I can merely emphasize two facts. In the first place, I admit that the horse market did not recover this spring as a great many of us thought and believed it would. That, however, was not the fault of the horses nor of the men behind the horses. You know if you go by the market quotations as a criterion of the standing of horses as a farm product to-day, you will be somewhat discouraged. It is a fact that the horse market is off, but it is not very hard to determine the cause. If you go to the city or simply read the papers, you know there is a certain amount of business stagnation still; concerns that have been working a hundred horses perhaps are only working sixty; they not only are not going to keep up their full quota of a hundred, but they may have turned that extra forty on the market, so there is a practical glut on the market and very little doing in the purchase of high class stock of horses, but the reason is easy of explanation—simply there is not the demand for horses and we firmly believe that with the return of normal business conditions and traffic, etc., incident to normal business activity, the horse will come back to his own. I can further assure you that those who know the situation best and have an opportunity to follow it into the future, are still pinning their faith to horses, so there is no reason why we should feel any discouragment, and no reason why the horse should not have consideration on the program the same as other farm products.

You may also wonder what can be said about the draft breeds that has not already been said, this being a very familiar topic. It is my purpose, however, to discuss these breeds from a little different angle. My object is to induce you, if possible, to study the breeds with which you are engaged with a view of making out what you can learn of their history, what possibilities may lie before them in the future; that is, we can foretell best about those things of which we can learn the most in history. I don't know of any line of business where a man starts out with as little foreknowledge as in the breeding of pure bred livestock. I do not mean now simply the principles of breeding. A man may know all about the principles of breeding and may be an authority on heredity and principles of that sort, yet if he does not study the history of the breed itself with which he expects to engage, he is very much in the dark as to what he is doing and what can be done. Therefore, I would like to take up the breeds of draft horses. We have to limit our subject and limit it to them, and I would like to take up the breeds of draft horses with a view to bringing out from a consideration of their history, what is inherent in them and how, by a knowledge of their inherent characteristics, we are better able to get the best out of them. It seems to me that this is especially essential.

I am going to show you some statistics a little later; I am not going to burden you with them, but I have one slide that will show what a dearth of pure bred stallions we have available for the breeders in this State, or the country for that matter. This State is a little worse off than some other states, and is better off than others, but there is a dearth of pure bred stallions available to the breeders. If this is the case, doesn't it behoove us to make the most use of the blood available and the most judicious use—make the most of it? And it is with that in view that I propose to discuss the draft breeds.

In the first place, what is a breed? I say a great many men are breeding pure bred stock, and yet I believe I am safe in saying that they don't know exactly what they are dealing with and it will throw a great deal of light on some of the results they get if they will just inquire and find out a little more about this thing they are dealing with. They do not realize that they have the embodiment of an hereditary force placed in their hands, and unless they know the extent of that force, the characteristics carried on by that force, they can accomplish very little in its direction. For instance, a breeder of Angus cattle is very much disheartened, and perhaps thinks somebody has put over a counterfeit pedigree on him when he has bought a bull and gets a red calf. I have known Angus breeders to become very much incensed because out of their pure bred, as they supposed, black cattle, there is all of a sudden a red calf born. If a man knows anything about the history of Angus cattle, he knows that the occurrence of a red calf now and then is perfectly normal and does not cast any reflection upon the stock he is working with. In the same way a man dealing with Berkshire hogs perhaps notices a sandy tint in some of his pigs and is disposed to think that someone has sold him as pure bred Berkshire, hogs that were not pure bred. He does not know that at the earliest time in their history, the pure bred Berkshires were red and the recurrence of this is a perfectly normal thing. Another man sees black spots on the ears of his Leiscester rams and begins to doubt the purity of their blood, and yet if he will go back in history, he will find that the man who founded the breed used as the most potent element in his flock a black ram and it is perfectly natural to expect black spots on the ears of Leicester rams. That gives you some illustration of what I have in mind about being able to account for things that happen and able to plan for things that have not yet happened but which can be brought about by the intelligent use of this blood.

We have J. H. Sanders' definition of a breed—it is a group of individuals possessing distinctive characteristics, (and I would like to emphasize the distinctive characteristics) not common to other members of the species. It makes a breed the division of a species just the same as the species is a division of a genus, and the second part is that these distinctive characteristics must be so firmly fixed as to be uniformly transmitted. We have a great many groups of individuals that possess distinctive characteristics not common to other members of the species, and yet those do not constitute breed groups for the simple reason that those characteristics are not sufficiently fixed to be transmitted. We could refer to a great many cross breeds. You take the cross breed and we can produce in poultry certain plumage conditions with a high degree of regularity by certain hybridizing processes, and yet you cannot take the cross breeds and get any distinctive results. In the same way the cross bred bullock in England and Scotland is produced with great regularity; blue-gray is produced by the mating of Newfoundland White Shorthorns and Angus Galloways, yet they have not qualified as a breed. As you study breed history, you find that some breeds have passed through an evolutionary period. Take the Oxford breed of sheep; it is a composite breed, almost a cross breed, the blending of two distinct types. Up to a certain time, those cross breeds would not breed with any degree of uniformity. The cross breeds themselves fulfill the first half of our breed requirements; they possess distinctive characteristics but they would not transmit them always until the breed had been so intensified that they would finally breed with a high degree of uniformity. The Oxford was accepted as a breed and classes made for it at the shows; that is what a breed is.

The thing I wanted to emphasize most about this definition is the distinctive character, and to them I want to call your attention. I have heard men say on several occasions that, to confine my remarks now to draft horses, that they would not breed to anything but horses of a certain breed in that same breed, and I have heard other men just as positively say that they would not breed to a horse of a particular breed under any circumstances. Now that is the kind of breed sentiments that I would like to break down. Partisan spirit is a good thing, competition makes for healthy rivalry that gets good results. But when a man is so partisan that he will take a position of that sort, he is not an intelligent, constructive breeder and he has missed the fundamental essential; and that is what I am trying to emphasize. On the other hand I have heard men say that breed didn't count very much, didn't figure much with them, they wanted to breed to the good horse. Now there are good horses in every breed, and that man's position is much more tenable than the position of the other two men, unless it be qualified by certain local conditions which affect the different breeds. I would always rather breed to the best horse, irrespective of his breed, than take a stand that I would not breed to a horse of one breed or to a horse of any other breed.

What are the distinctive characters, which are the things that distinguish one group from another, the result of certain agencies that have been transmitted in the history of the breed and which they themselves are going to transmit to future generations of this breed? They are the things that have to work out of the breed; they are working out to produce a certain class of market horses. The buyer, nine times out of ten, pays no attention to breed, he buys on contract, he has certain specifications to meet. Maybe when he gets his carload of horses together, you and I who know breed will go over them and say they are all Belgians or Percherons. How does it happen that they are so uniform? Because he has been after a certain type of horse and the specifications he was trying to meet have been the specifications that were most in line with the distinctive characters of this particular breed, and as a natural matter of course, the horses he got together will be of that breed; nine times out of ten that is about as much a figure as breed cuts with the ordinary buyer. But say we want to fulfill a contract or a near market demands a certain kind of horse and we are laying our lines to produce it in the future; that is the time to look at the breed in a non-partisan intelligent way.

There are certain horse characteristics we want to produce in future generations and you cannot get anything out of a breed that has not been put there any more than you can get an element of plant food out of your soil that has not been put there if it was not there in the beginning; and yet I have known lots of horse breeders who were endeavoring to get something out of their breed of horses that had never been put there and the reason they did it was that they did not know what had been put in and, therefore, did not know what they could get out and were getting a good many things they did not expect and could not account for and were failing to get a good many things they had set out to get. Now I say that the distinctive characters are the result of definite agencies that have been operating all down through the history of this breed, and you can put them in three groups: First, everything that comes in the line of foundation stock, original blood. Some breeds owe almost all their distinctive characters to the blood on which that breed was founded. The original stock has been very little altered as it has been bred on down in generation after generation. In the second place, we may have the operation of environment so that the characteristics of that original stock have been almost completely lost and new ones introduced either in whole or in part through the influence of environment; and then third, and I think most important of all, and of course involving the other two to a certain extent, is selection. The purpose of the breeder, the ideal of the breeder, the standard that he has had in mind all through these different generations, during which he has been moulding and creating new forms and types.

Now I will show you two pictures a little later of representatives of two breeds, and I think the whole difference between them can be accounted for in that way, it is the main factor. They are practically identical in blood, so far as the foundation is concerned; there has been no admixture in either breed of recent date and comparatively little difference in their environment, and yet to-day they are as unlike as two different horses can be, and the reason for that unlikeness is the fact that the breeders of one breed have had one ideal of what a draft horse ought to be and the breeders of the other breed, another idea; so these are the agencies that have operated, and as we work with our breeds, let us bear this in mind, let us remember that that horse is not an individual; that is an important thing to remember.

When we study the individual, the first thing to take into consideration is whether or not he is a representative of his race. The man who says he would not breed to anything but a Percheron horse, may find the only Percheron horse available a very inferior individual, while there may be available a Belgian horse that stands away up as a representative of his breed, and yet a man will tell me he would not go to that horse because he is a Belgian. The first thing to consider is whether or not the individuals available to us are representatives of their race, because the individual, male or female, does not transmit merely his or her own characteristics but all the characteristics of their ancestors. Now if they are better than the average of their ancestors, you know what the effect on the offspring will be—their colts won't be as good as they are. Why? Because their ancestry is pulling them down, they have shot ahead of their ancestry a little bit, and yet there is the drag of the race pulling them back to this common level; the average of the offspring always represents the average of the ancestors; if you have just an average individual, he represents the average of his race and you are safe in assuming that the average of his get will be just about like him. If you have got an individual that stands away higher than the average of his breed, then you can hardly expect his colt to be as good as he is. If, on the other hand, you have an individual away below the average of his race and he is pure bred and has strong limbed, fast ancestors behind him, you may expect those ancestors to help boost his offspring up to a little higher level than he himself is.

A Member: Can you say a word about the Mendel Law.

DR. GAY: Well now, Mendel's Law has not been demonstrated very clearly yet on horses. Mendel's Law has thrown a lot more light on the subject of plant breeding and the breeding of rabbits and guinea pigs than on horses and cattle; they have demonstrated that the color of horses comes under Mendel's Law and the horn and whole character of cattle comes under Mendel's Law.

A Member: It doesn't run clear through?

DR. GAY: No, it does not hold in all cases, and we don't know yet in which cases it holds and in which it does not; it is a pretty deep subject to attempt. The thing to consider then is whether or not we have an average individual and bear in mind that that horse is transmitting, not his own character but the character of his ancestors behind him.

A Member: We have a black mare that has a bay colt, just like, in shape and color, the dam of the sire.

DR. GAY: Well, now, when you get into color in horses, you have got a very wide range of variation to deal with, in the first place, and almost any color will come along. But this much has been proven; the experiment station has issued a bulletin; Mr. A. B. Cox, a breeder of trotters in Philadelphia, has given a great deal of study to this thing and has also done some work along this line and has demonstrated the recessive and dominant character under Mendel's Law that a chestnut color is recessive, and any time you breed a chestnut horse to a chestnut horse, you get a pure chestnut. If you breed a roan to any other color, in nine times out of ten you get a roan. Old Jaybird proves that; two or three generations removed from Old Jaybird, he is a roan because roan is a dominant character and blocks out the other. What I want to impress on you is the fact that we cannot find out all the characters inherent in the individual by looking at him; he does not manifest in his physical make-up everything he has inherited from his ancestors; he only inherits the characters that are dominant and has a lot of recessive characters, yet he will transmit them just as regularly to his offspring as the characters he himself manifests. How are you going to know, unless you should study their ancestry and see what the foundation blood was and how much it has been modified and see what the breeder himself has had to do not only in improving but in shaping the type?

My purpose to-night is to show you representatives of the four great draft breeds and to try to point out in those representatives the distinctive characters that each breed posseses by virtue of one or more of the three agencies; and then lead you to see, on account of the fact that he possesses those distinctive characters as a matter of natural consequence in heredity, those are the characters he must be expected to transmit. I am not talking about pure breeds except from the sire's point of view; I am talking about the parentage of your pure bred farm horse with your farm mares for market geldings. The first slide I will show you has a lot of statistics which I won't expect you to remember, but there are two or three things. In the first place, it shows the position of Pennsylvania as a horse breeding state. The ten leading horse breeding states are arranged in order. These figures have been compiled by Wayne Dinsmore, Secretary of the Percheron Society of America. Naturally they are colored a little stronger in Percheron figures, but nevertheless the figures don't lie, they are facts. In the first place, you notice what he says at the top, horse breeding shows improvement, the grades are decreasing and pure bred sires are on the increase. That is generally true, but not of the whole country, especially in this State we have not increased very much in the total number of stallions licensed, but we have increased very materially in the number of pure breds in reference to the number of grades, and he finds that to be true all the way through.

The states are arranged here as they stand: Illinois first, Iowa second, etc. The main thing I wanted to point out here is, what I called your attention to in the first place, our dearth of pure bred sires. This table shows the number of horses; that means mares or gelding or anything else. Take the total census of the horses in the state, then take the census of pure bred sires in the state. Now Iowa is the lowest; in other words, it is the highest; they have 276 horses per pure bred sire; that is, for every 276 horses in the state they have a pure bred stallion. We have a pure bred stallion for every 880. I think, I am not sure, but I think it is very much lower than Iowa which shows you that we have, as I said in the first place, a dearth of pure bred sires and it behooves us to make the most of every one that we have. Now we say that a pure bred representative possesses distinctive characteristics not common to other members of the same species to which he belongs.

There is, however, one thing they possess in common; all the representatives of the breed must first of all be draft horses, Now the distinctive characteristics are over and above that, fundamental characteristics are, you will find that in all our breeds there is this fundamental characteristic; we have four great beef breeds, some are black, some red and white, some red and white and roan, but they are first of all beef breed cattle; we have four great dairy breeds; some are colored one way and some another, but every one of them is a dairy cow before she is anything else; and so it is in draft horses; they must first of all be draft horses. This is not only a representative of a breed but he is a representative of a draft horse, and I admit that a draft horse is not as much in order in this part of the State as in the east; that is, I mean by that we have to emphasize draft horses down there because the breeders don't know so much about the draft type. I know that Crawford and Mercer counties are the two great draft horse counties of this Commonwealth, so we don't have to explain a draft horse to the natives of this corner of the State; but down in our corner, they are brought up with a light legged horse in their minds. Here is a draft horse of standard weight close to 2,500 pounds and there is not an overgrown thing about him. You see he is low down and wide out; he is compact, he is deep, he has got the muscleing, he has the bone and if you could see him move, he has got the power in his way of going; he just looks as though he'd pull the corner out from under a house. So that in our draft horse standards, they must have the scale, they must have the substance; while this horse has some fetter there, he has a wonderful quantity of bone in addition to the fetter. You can see it is not beef that gives him his 2,400 lbs. weight, but the way he is made.

All those breeds must conform to the standard, first of all; some conform more closely than others; others depart a little bit from the extreme draft standard. While we have him on the screen, I will say that he is not only a draft horse but he represents the draftiest of all the draft breeds, namely, the Shire. This stallion sold for $12,000 and is supposed to be the best Shire horse shown in this country, and he has won prizes in England before he came here. I have heard men say they wouldn't breed to a Shire. I would breed to a Shire; I would consider it a privilege to breed to this horse and would pay a good big fee to do it and buy a lot of horses of the other breeds to get to him if possible. The characteristics we want to seek in the Shire breed, that we get in the Shire breed, and we don't want to go to a Shire if we don't want those characteristics, are first of all, scale; there is no other horse that will average as great a weight as representatives of the Shire breed, or as much bone and substance and muscleing as the Shire. There is no breed but one that will average as massive and drafty a body as the Shire. If we want those things we must go to the Shire to get them. But every breed has certain characteristics, characteristics not as desirable as those I have named, and it is as essential that a breeder shall know the undesirable characteristics as the desirable; and it is only when a breeder recognizes one as well as the other that he can begin to improve them along the desirable lines, but just as long as a man thinks the stock he is producing is all right, that man is going downhill instead of up, but it is the man all the time on the lookout for the little defects and trying to stop them who is the man that is all the time raising the standard and getting up.

Now grossness in size and quality do not go together; it is a good deal easier to get a pony well shaped than it is to get a horse that weighs 2,400 pounds. When we take his great weight and scale as fundamental, then we have got to make some concession and must expect him to be a little plainer perhaps in the head; although this horse is especially good in that respect, we have got to have some better. I learned that lesson in Crawford county and never have forgotten it. A man brought a Shire horse he had just bought to show to a number of us and he was a very ordinary looking two-year-old but did have pretty good bone. One man says "Why did you buy that colt?" He says, "I wanted bone." He was a very hairy legged horse and another man took exception to that hair, and another says, "You can't get bone without a bit of fetter." That happened to hit me and I have kept it in mind and made my observations along that line ever since. I admit that a nice clean legged horse looks better, but I am absolutely certain of the statement that you cannot get the bone without a certain amount of fetter, and rather than have the absence of bone and what goes with it, I'd get the fetter and get it fine. I don't want these great big shaggy legs, but nice fine fetter on a draft horse makes him look as if he had timber under him, and the draft horse men who know this and know the game best are the men who don't take that fetter off their legs, so you have got to expect a little grossness in a horse of this kind, you have got to look out and see that you get all bone and no quality otherwise. He is the horse that gives us our scale and draftiness and it has been demonstrated very well on the Chicago market that the highest class of geldings, as they run, especially those that range around a ton, have got a dash of Shire in them, the majority on the dam side. James Johnson calls attention to the fact that a great deal of the credit that ought to be going to Shire horses because the Shire blood comes through the dam side is being given to Percheron and Belgian and Clydesdale horses because they happen to be the sires of these horses, and yet anybody can go back and read Shire blood that came through the dam side, and if we knew more about them, we would be attaching more importance to the Shire blood in their ancestors, so dont' turn against a Shire simply because he is a Shire.

I will show you the pictures of two breeds that represent practically the same foundation stock and almost the same conditions of environment, but two extremely different ideals on the part of their breeders. Here is a representative Clydesdale. If you want scale, bone, extreme draftiness and all those things, don't go to the Clydesdale for it, the Scotchman's idea of the draft-horse is a horse that can go away with a straight, friction-less, springy stride with considerable length. That is fundamental to the draft horse. The Englishman's idea of a draft horse is grossness, hulk, bulk, scale, and he sacrifices anything else to get it. In order to get this straight stride that the Scotchman is so insistent upon, the horse would be longer legged to give him more freedom of stride and will have to have a little more range in body. Also, it won't be as thick, because, by the law of correllation a short horse, short in legs is short all over, and a long horse long in legs, is long all over, but he would rather have him a little narow and go straight than have a wide front and roll as these great big massive horses do, and then he wants him to hit the ground in a springy fashion and go with his hocks under him and close together, therefore he has a hind leg that is set more accurately; there is more mechanical perfection in the hind leg of a Clyde horse than any other horse.

I will show you some grades gotten by horses of these different breeds, and from them you can gain some idea of how their hereditary characters are transmitted. Here is a great Clydesdale; this is not characteristic of the breed; some of the Clydes carry the slope of the pasterns to too great an extent. Here is a horse that stands a little low on his knees and he has a foot that is alleged to be representative of this breed, and the feature of his foot, the worst one, is the one that is usually mentioned last, but you see here that same lofty carriage of head and neck; the neck has some space to it, so there is place for a shoulder. We have a pair of Clydes here in harness, showing the same general character. See how they stand on their pasterns, how springy they are, how their hocks are close together how straight they are. That is a long length of neck they have got in front of the collar. A Scotch collar like that will cover up almost the neck of some draft horses, and you can see by the way they stand that they will go off in that snappy, springy easy stride that the Scotchman is so insistent upon. Here is a stallion of a breed more familiar to us. I don't know that you noticed it on Mr. Dinsmore's chart, but there are more Percheron horses in this country than all other breeds combined, and more in this State than all others; they outnumber the other breeds three to one, on an average. Of course that is the real reason why Mr. Dinsmore got together the figures I showed you first, but he introduced incidentally the other figures which meant more to us at the time. Here is a breed that owes a lot to the foundation and I do not want to detract one bit from the credit that belongs to the Frenchman for the production of this almost universal draft horse; but on the other hand we must see in this horse certain characteristics that go right back to his foundation blood, and much less altered by man's tampering than in the case of the other two breeds I have shown you.

Here is a horse that has his foundation away back in early times, in the first place, in the so-called Flanders horse, a horse of cold blood, characterized by his bulk and coarseness, his black color, the amount of hair he develops on his legs, tufts at his knee, tufts at the point of his hocks and even a mustache at his lips; very slow and awkward in his movements. That was the foundation. On that top course, first, accidentally and afterward with malice aforethought, were made infusions of color through blood. The accidental way in which that occurred was in consequence of invasion back in the days of the Saracen invasion, the barbarians came north into France and were overpowered and their mounts, which were largely stallions, fell into the hands of the victors and were distributed among the French soldiers and taken back into the country and became the leaven in the horse stock of that country. The Crusaders accomplished the same thing, and after that, when the influence of this blood was demonstrated, systematic importations of oriental blood were made into France and while there are no oriental stallions close up in the pedigrees of our Percherons today, if you go back you will find they go back to Jean La Blanc. This horse has a finer breed of head than any draft horse, finer ears, a fuller, clearer eye, more sharp definition of features. We see it in his disposition and temperament. He is active, snappy. We see it in the character of his bones. The trouble with the Percheron bone, nine times out of ten, is that there is not enough of it, it is too fine, and we see it in the character of his hoof. He has got a hoof that comes from the hot blooded horse.

And, finally, what can he do. The Percheron horses are the most versatile, they can do the greatest variety of things, and there are a great variety of types running through them. The old fashioned Percheron horse is a general purpose horse. If you could see some of these old fashioned Percherons, or pictures of them, I think you would find your ideal for the general purpose horse, but when the demand came for bigger horses, they had to put more cold blood into this stock and bring up the size and scale, but they have done that very skillfully and have retained the features of the old oriental stock. So here is a breed that, while he owes a lot to the men who have bred him, we can still trace his ancestry in the general characteristics he manifests to us to-day.

Why is the Percheron horse more numerous in this country than all other breeds combined? Is it because he had the earliest start? No, it is because he made the first hit; he was the horse that the farmer took up as the one thing that suited him in the way of a horse, and from way back in 1851, the days of Louis Napoleon, until to-day, the Percheron horse has received the stamp of approval of the farmer. This is the reason—he is a versatile horse, he can do anything, and the Percheron stallion is just as versatile a breeder as the Percheron horse is a performer. You breed a Percheron stallion to almost any kind of a mare and you will get a market horse of some sort. If he is spotted with light hairs, he will make a snappy, active draft horse; if lighter yet, he will make an express horse with a good long stride that can step away with a load. I have seen some half breed Percherons that could go up as high as any coach horse and I have seen some hunters that could endure as long as the hounds ran, and once in a while you will find a Percheron that can step better than a four minute lope. He is versatile, fits in all around, and that is the reason we find him so popular in this country. This is the little horse that has been spoken of so many times and is shown in another picture, in the lead of this type that I refer to. That shows you the ideal to be sought when mating mares to a Percheron stallion. I say he will get a marketable colt out of most any kind of a mare, but you want to give him a chance and give him the best kind of a mare and then you can expect to get something of this sort.

A Member: I observe in the cities that some of the better grades of Percherons are of a gray color; is there anything to show that the gray Percheron is a better horse than the black Percheron?

DR. GAY: Well, there is ample evidence to show that the gray Percheron geldings on the city streets is a lot better horse than the black. In the first place, there is no doubt that the gray horse does not feel the heat as much as a black horse does. Take a lot of soil, put lamp black on part of it and something white on the other part and stick a thermometer down on each one and see which registers the highest.

A Member: But you take a horse on the street that appears to walk along easier even at this time of the year, when the heat is not a factor.

DR. GAY: You take Wanamaker's stables in Philadelphia; they won't buy anything but a gray horse. That is one reason. Another reason is that they can match up their pairs. Take a bay horse and nine times out of ten it has a mark on him and especially if you are putting three or six together, and they blend better with the ordinary red and yellow or green color of a wagon on the street, and it is more easy to get an even shade of grays than any other color, and they want that uniform color throughout their stables and find they can get it more easily in grays than any other colors. Swift first told me that they pay $25. or $50. more any time for a gray horse than any other.

A Member: Some think that a gray stallion is better than a black stallion; is that a fact?

DR. GAY: They used to tell us that a black stallion would get more gray geldings out of the average run of mares than a gray stallion would, but I don't think that is so, I think the gray will get more, but on the streets certainly more favor is shown to a gray horse than a black one.

A Member: How did they get that increased size in Percherons for the last 24 years?

DR. GAY: By going back to more of the old Norman blood; they have increased the percentage of that, yet they have skillfully retained the characteristics of the hunt blood.

A Member: It is not quite the same tempered horse.

DR. GAY: He is a colder horse to-day than he was 25 years ago. There is no question about that, and it is only due to their care in selection that he is not colder than he is. There is a nice pair of farm horses that have won prizes in all parts of the country and show every evidence of Percheron breeding. Here is a horse that has won prize after prize at Philadelphia workhorse parades, and isn't he a Percheron? He has the earmarks all over, although you see he is a draft horse but the product of a Percheron sire, probably the old fashioned sort, lighter, snappier, joined on probably to a good stout mare. Here is a representative of the fourth breed, a breed that by the way is showing a greater percentage of increase than any other breed in this State, and I think that is true the country over.

The breed of course has had a serious set-back on account of the war. We don't know just what we will do in the future for Belgian horses. We in this State I guess will depend on our Crawford and Mercer county breeders. Here is a breed that descends even more directly than the Shire from the old Flanders horse I have referred to. In the first place he is rather cold, he don't show the characteristic breeding about the head that the Percheron did, but he does not show the great development of hair that was characteristic of the old Flanders horses; he is a clean-legged horse as far as we can have him clean legged, yet he has bone enough to be in the draft class. What are the essentials of this breed? They are more environment than foundation stock. You have high hips from here back and from here up; that is, take the head and neck and legs and feet off a Belgian horse and I think we are safe in conceding that he will beat the world. There is no horse draftier in his body. You remember I said the Shire was the draftiest bar one; this is the one. There is no horse so compact, wide and deep as a Belgian unless it be a Shire; and wonderful ribs; but there are some things associated with that we have always to guard against. With this extremely short back we like so well in draft horses, we are always going to get a neck correspondingly short. If his neck is too short, it will have the same shape as a hog's neck, and where are you going to put a collar? A horse has got to have some shape to his neck to have a good collar. In the same way the extremely short body oftentimes gives us a very short leg that has a rather sturdy pastern with it. Don't understand me as complaining about the features of this breed.

I neglected to mention the heel of the Percheron. Those who did not like the feet of a Clyde horse, how do you like the hind legs of a Percheron horse? If the Percheron breeders don't do something to improve the hind leg of their breed, they are going to suffer the same as the Chester hog breeders did in Iowa. The breed was so popular that every white hog was called a Chester White, with the result that the breed itself fell into disrepute.

A Member: How do you like the forelegs of a Belgian horse?

DR. GAY: If he has got pastern enough, I like him all right.

A Member: What about his small knee? Can he pick himself up any?

DR. GAY: I say the best part of the Belgian horse is from here up and from there back and within those limits he is a pretty hard horse to beat. But when you consider the wonderful improvement wrought in the last 15 years, you have great hopes for the future.

Here is the proposition; what kind of mares are you going to breed to a Shire horse? What kind of mares are you going to breed to a Clyde? What kind to a Percheron? What kind to a Belgian? You will find that the Belgian horse will give you drafty bodies on colts out of the average run of mares we have in the east that carry a predominance of trotting blood, quicker perhaps than any other breed. You understand you cannot cross a cold blooded horse on a hot blooded horse; the more extreme your crosses, the more variation you get and as a result you come to a head-on collision; they simply stand at loggerheads; but on the other hand, if you can take a mare that is not too hot blooded and a Belgian horse that is not too cold blooded and make the mating there, I think you will find that you will get a better, draftier shape and form from a Belgian than a stallion of any other breed, on an average. The criticism of the Belgian is that he is cold, lacks quality, is not good in the face and legs. Our trotters will give him enough quality and enough refinement about the head and neck and enough bone in the legs and he will give them the body, the point at which they are most markedly deficient. Here is a pair of Belgians of Belgian breed.

A Member: Would you then cross a heavy Belgian or trotting mare with a Belgian sire?

DR. GAY: No, I say you cannot make two extremes a cross; you cannot take one of a straight hot breed and one cold breed and mate them, because you are liable to get a Belgian head and maybe a trotting horse body, and Belgian legs and trotter's feet. They have got to be somewhere nearly approaching; but what I mean is that where you have comparatively draft mares but averaging light waisted, leggy and want their form improved in draft lines, that is the class of mare that the Belgian horse will do the most good on. These are Belgian. They have the characteristic red color. They don't stand quite as nice on their legs as the Percherons or the Clydes that you saw in the other picture, but they have the form and shape. These are Percherons again, the same as I showed you in the first place.

In conclusion, let me just simply say this; when we talk about breeds, don't take the same stand on breeds that you take on politics—what we call voting on principle. Don't vote for a Percheron horse simply because he is a Percheron horse, but make him be a good one before you vote for him, and when it comes to a choice between a horse of definite breed or one by different lots of stallions, take the best horse regardless of breed and I think you are safer than you are to follow out this partisan breed sentiment that so many people express.

The CHAIRMAN: The next speaker is too well known to need any introduction. His subject is "The Pennsylvania Experiment Station, Its Work and Lessons," by Prof. R. L. Watts, Dean of the Experiment Station. It affords me much pleasure at this time to introduce Prof. Watts, who will address us.

Prof. Watts spoke as follows:

THE PENNSYLVANIA EXPERIMENT STATION, ITS WORK AND LESSONS

PROF. R. L. WATTS, *Dean Experiment Station, State College, Pa.*

Mr. Chairman, Ladies and Gentlemen; Friends and Farmers' Institute Workers: Some time ago I was told a story of a boy who had been given a very large toad as a pet and he kept his toad out in the yard where he could see it every day. A great many things about the toad interested the boy; but the thing that interested him most was the great variety of food the toad would eat. He took out little crumbs of bread; he would catch bugs and flies and even give the toad little pieces of tobacco sometimes. It seemed to eat everything with relish, and one day he found a very large, fuzzy, wooly worm and was wondering whether the toad would eat that worm. He took it out and the toad ate the worm and seemed to enjoy it. Later in the day he thought he would go back and see how the toad was, and he went and found the toad on its back with its feet sticking straight up into the air, tickled to death. Now that is about the way I feel when I come before an audience of friends, institute workers, I might say co-workers, because I have worked with many of you at the Farmers' Institute. I am afraid though that instead of being "tickled to death" to-night you are just about frozen to death and I am going to make my remarks very brief.

I have quite a number of pictures, but we will pass them through rapidly. The longer I live the more impressed I am with the fact that successful farming depends very largely upon the application of correct principles, that if you do not apply correct principles, your farming will not be successful. In other words, if you don't know that a thing is right when you do it, the chances are that your attempt will be a failure. I am going to illustrate that point by referring to a few personal experiences. One time I was down in Washington county, or Greene, I have forgotten which, attending a Farmers' Institute, and at the close of the afternoon session a farmer invited me to inspect his orchard. I went with him in his buggy to the orchard two or three miles distant, looked over the trees and made this remark; I said, "I believe that the thing that will help your orchard more than anything else is a liberal application of stable manure." I have never forgotten how the farmer was shocked by that statement. "What? Stable manure in an orchard?" "Oh," he said, "I don't agree with you at all." I said, "All right, you don't need to, but that's my judgment." Now I don't know that that was the thing that his orchard needed, but I thought it was the thing he should do to that orchard. Now if that same man or other men should ask me the question concerning an old orchard that was starved to death, I would say without doubt that that is a thing that should be done. Why should I say that with such conviction? Because our own experiment station, your experiment station at State College, has found, by experimentation on a large scale on different soil, types that there are many cases where a liberal application of stable manure will do an orchard more good than any thing else, and my answer to that man was probably guessing, because we did not have data at that time which showed conclusively that that was a thing which should be done.

Let me give you another case; suppose a farmer or fruit grower fifteen years ago, when I attended a great many Farmers' Institutes in Pennsylvania—suppose that a farmer should ask me this question: What formula would you recommend for an orchard in bearing? What kind of an answer would I have given? Well I would have probably said this, "It is possible that you could use a fertilizer that would contain 4% of nitrogen, but it is unlikely, because nitrogen tends to develop growth, foliage, instead of fruit, and therefore I would be a little careful about that nitrogen; it is possible that only two or three per cent. will be enough; put on 8% of phosphoric acid, but potash is a thing all our fruit need, so put in 10% potash." Now what would I tell an orchardist in this State who has bearing trees? Would I give him that kind of an answer? Not at all; I should say, "We have found in our experiments, harvesting thousands and thousands of bushels of apples every year, that it is not potash that determines the fruiting qualities of an orchard, but it is nitrogen. We have found on twelve different soil types, that nitrogen has more to do with a big crop of fruit than potash." I suppose Dr. Stuart might say, "Use 6% of nitrogen, 8% of phosphoric acid;" and under certain conditions I think he would drop the percentage of potash to four instead of ten. What would cause him to give an answer of that kind? Why, the harvesting and the weighing and measuring of thousands of bushels of apples that have been harvested from orchards where he is making experiments.

Now when we must know the truth in farming if we want to win out as a business proposition, and that is why we have in this State today and in every other state of the Union an experiment station to find out what is the truth with reference to the use of fertilizers and spraying material and foods and everything of this kind. We don't want to be guessing, farmers; we want to know what is right when we do things on the farm, and, therefore, Congress has been very wise in making rather liberal appropriations for experiment stations in different states of the Union. Now to-night it would be useless for me to attempt to give you very many lessons from the experiments at State College so that I have decided to show you rather a large number of pictures—in fact you will think this is a sort of "movies" to-night by the time I am through—that will show you the kind of work that we are doing at State College along experimental lines rather than the exact lessons that might be drawn from these numerous experiments. I want to say here at the outset that we are conducting three or four hundred different experimental projects and that we stand ready at all times to give farmers and friends and lecturers information concerning the results of these experiments which are conducted with fertilizers, livestock, horticultural crops, fruits and vegetables along almost every line.

Now if we have the light we will show some of these pictures. The college operates about 1,500 acres of land on which this experimental work is conducted, much of it, and where we provide feed for our stock. Before taking up the experiment station work, I thought you would be interested in seeing a few general views showing the college. This is the main building, the first put up on the campus. This is one of the oldest buildings on the campus, the armory, used more largely now as a gymnasium, showing attractive plannings around the building. This shows what it looks like on the campus sometimes during the winter. You will see here also the character of the trees on the campus. We have a great many fine specimens of various kinds of evergreens and similar trees. There is the Norway spruce, heavily loaded with snow. It seldom breaks with a heavy load of snow, which cannot be said of many of our trees. This shows the agricultural building, which was the second of the new buildings, the newer buildings on Agricultural Hill. Over here to the right is the old experiment station. Here we have a picture of the new horticultural building which was completed last year and is perhaps the best single horticultural building in the United States to-day, completed at a cost of $120,000. That shows the entire student body assembled in front of the auditorium. The enrollment of the college is now about 3,300. Eight hundred of this number were summer school students. This shows the growth of the enrollment of students in the School of Agriculture. Back here in 1904-05 we had only 73 students; the next year we had 94, the next 111, the next 202, and so on, and this year we have 1,237.

I want you to note one thing about this chart showing the enrollment of agricultural students, and that is that this line is decidedly shorter than that. We enrolled fewer students last year proportionately than the year before. Do you want to know the reason for that? Simply because the college was forced to refuse admission to several hundred students because of lack of class room and laboratory facilities; everything was filled and we were unable to take care of more students. I hope that condition will not exist at State College very long, because one of the hardest things we have to do is to turn away farm boys who have saved money to take a course of study and send them home again because we haven't room for them. They seldom return to the college to take the course.

A. Member: How many farm boys are in the enrollment now?

PROF. WATTS: I cannot tell you exactly. The courses in agriculture seem to be attracting more students right now from towns and cities than from the farms. It has been said that the farmers' boys take engineering and the city boys take agriculture. I dont think that is likely, though I suppose we have in agriculture five or six hundred students to-day. That point is exceedingly interesting. Some have said that those city boys will not make good on the farm. If the city boy makes good in his college course, if he stays there long enough to complete a college course and acquires in addition to his technical training practical experience, the city boy will win.

If I had time I would tell you about a good many city boys who have become farmers, gone into various lines of agricultural pursuits and are making good. It is simply a matter of whether he has the practical experience or not. This shows a football game among the students on the college campus. Whether it is of value from a military standpoint, it is an excellent thing for the students to have this military training of two years; it gives them better carriage, teaches obedience and has a distinct value. This shows the exhibit made at the county fairs every fall; we have it in duplicate and show it at a number of the fairs every fall. That shows the farmers at Farmers Week. Last year or perhaps the year before we had something over a thousand people at Farmers' Week. It is always held between Christmas and New Year Day. Here we have a rear view of the Dairy Building. Most of you know that the college operates a commercial creamery placed in this building. Several hundred farmers send milk or cream to the dairy building; it is open to admit all kinds of dairy products, cheese, butter, ice cream and so forth, and much of this work is done by students, so it is a commercial proposition and gives our students actual practice in working up dairy products. You have heard probably of the new dairy barn which was completed last summer, and many people say this is the best looking and most popular building on the campus. It was completed at a cost of something more than $30,000. There is one statement I hadn't thought of making at this time, but I think it is right you should have it; the legislature appropriated $20,000 for this barn, and from the earnings of the college farm and of the creamery, we were able to put more than $10,000 into this building, so that we have a structure there of over $30,000. There are some features about this building that perhaps will interest you. We have two large silos, one at either end of the barn. One is built of hollow tile with stucco finish; the other of concrete with stucco finish. You will notice there is no barn floor such as they have in most barns. About half of the building is used for the storage of hay. Last summer we had 100 tons of hay stored at this end of the barn; over here we have our feed rooms, students' rooms and other rooms necessary in structural work.

The next few slides will show this barn. On the side here is a milk room and you can see the large number of windows all along the side of the room. Here you will see more details of the construction of this stucco over the end of the barn and along the side about four feet of the base of the barn is brick. This is the interior of the yard enclosed on three sides; a very cosy, sunny place for cattle, in the winter time. We think we have the best barn in the United States, considering the size and type of construction, and it was put up at a very low cost.

A Member: What is the size of it?

PROF. WATTS: I don't believe I can give you the dimensions of that barn. Is there anyone here from State College who remembers the dimensions? It is a large barn. Here we have the interior view. You will notice that the cattle face each other. The feed is taken down here on the cart and delivered along in front of the cattle. Then the manure is taken from the stable around the side. You will notice the carrier. One of the best lines of work that is being done in the dairy department is the judging of butter. Butter is sent in from all over the State, from creameries and farms and individuals, and it is scored and the results sent back to them. It is a line of work which has been very productive for good. I want to show you two animals.

All the pictures you will see of animals to-night represent cattle or stock on the college farm. We have here an Ayrshire cow which is a very good specimen. Here is a Guernsey of the college herd. We are attempting to build up four herds of the leading dairy breeds. We have here the Jerseys. I am sorry to say that we haven't anything to show to-night of the Holstein. Here are some of the Jersey cattle on pasture near the Experiment Station. A large part of the college farm is used for pasture purposes. Here are some Jersey calves. Here's the Ayrshire bull which heads the herd. Now in our cow testing association work, which is growing and is growing in importance, this is one of the cattle, one of the cows, which was found—a very poor animal, as you will see, and the next picture will show you a profitable animal. There is no question about the fact that there are hundreds and hundreds of cows in Pennsylvania farms that are simply boarders, not paying any profit at all.

I want to show you a few views of the horticultural department. Here is some intensive work in gardening and overhead lines of irrigation. There is something that I think every farmer and villager who has access to water at a pressure of 15 pounds or more should provide at least for the home garden. It certainly makes production much more certain in commercial gardens and adds to the profits of the business. This shows a lot of seedlings of cabbage, showing how much stronger some varieties are in germination than others. Mr. Myers, of the Department of Horticulture, has been making a study of strains of cabbage for a good many years. When I grew cabbage some years ago, I thought the only thing to do was to buy seed of a certain seedsman because I considered him reliable and thought he had the best seed. I want to acknowledge that to-night, because I used seed from a certain house. The probabilities are that I lost $50. or $100. an acre some years because that was not the best grade of cabbage. This is a row of cabbage from seed gotten from one of the best seedsmen, which is decidedly leafy. This is very much smaller, while that will not approach this variety or strain in ability to make money. This shows a view of the entire field, or part of it, in the cabbage work. Now the next picture shows the great difference in maturity; that row of cabbage remains while this row has been cut out. That row was cut out and sent to market and brought high prices, while by the time this row was ready, the prices were down. Some of these strains have been making a hundred dollars more to the acre than another of the same variety, and if you can buy or produce seeds that will make $100. or even $25. more to the acre than an inferior strain, it is certainly well worth taking into account. That shows a plant grown from seed bought from one of the most reliable seedsmen in the country, a leafy type with a very shall head. Note the difference; there we have a conical had; it is hard, goes to market at a high price and pleases the consumer. Both are Jersey Wakefields. These strains of cabbages, tomatoes and other vegetables vary tremendously in their earnings and their yielding power. It is all Jersey Wakefield cabbage, but a different line of each variety. The black line represents the first type.

Note here that this variety or that strain cut only two-tenths of a ton the first time they made the cutting, while down here this line cuts four and a half tons at the first cutting. Suppose we are getting $50. or $60. for cabbage the first cutting—see what a tremendous difference it makes. This strain yielded only 4.1 tons of Jersey Wakefield, which does not produce high to the acre, while there are other strains that ran 8½ tons to the acre. You will note a great difference in the yielding power of different strains, showing the importance of good seed. The same thing is true of the tomato to a less extent. The black lines represent the tomatoes harvested up to August 13th, while the long lines represent the total yield. This strain yielded a little more than half as many tomatoes as this strain. Suppose you are growing tomatoes for the canner for which you are getting $10. a ton; you have a strain that produces 12 or 15 tons of tomatoes to the acre, say 15, which is not an unusual thing. We have many strains at State College which are running 15 tons to the acre. That means $150. to the acre. Suppose you have other strains that produce only 10, that would be $100. to the acre—quite a difference. There are wonderful possibilities from using better seed on Pennsylvania farms, not only in market gardening but in general farming as you will see later from some pictures.

This is an interesting picture showing the influence of soil in the starting of young plants. This experiment was started just this spring. Most gardeners believe that the thing to do is to mix up a good rich soil for starting the plants. These plants were grown in rich, limestone soil in the greenhouse. I want you to note that these plants are strong, vigorous and healthy. I also want you to see that the root growth is not very strong; the top is all right, the foliage is all right, but the roots, with the exception of that plant, are not very satisfactory. Now note the next picture and see what that looks like. Here we have small plants with long, strong, vigorous roots; these plants were grown in pure sand. Before I started on this trip, I went out to the field where these plants are now growing and noticed that these plants, which are plants with small tops but large root systems, are probably a third larger at this time than these plants grown in a rich loam soil; so the lesson drawn from this experiment, although this is the first year it has been conducted is, that it is not desirable to start planting in soil too rich. The all important thing to accomplish is to produce a strong, vigorous root growth rather than excess of top growth. In our tomato experiment, we found a plant a few years ago which produced tomatoes like these, all cracked and rough, ill shaped tomatoes, and those plants that continued to produce that kind of fruit where no attention was given to selection. On the other hand we have found plants among various varities which were unusual in their fruiting qualities and produced tomatoes like these.

Our truckers are learning that they can make tremendous advancement in their profits and yields by exercising greater care in the selection of seed. The next picture shows the same lesson. Here were two unusually good plants; over here we have harvested from that plant 89.9 pounds of marketable tomatoes; from the plant over there we have marketed 80 pounds of good tomatoes and harvested 6.2 pounds of tomatoes not fit to send to market. Those are unusual yields because they were grown on plants unusual in their profit yielding capacity. A variety of tomato known to everyone is the Masters, a new variety. It appeared 8 or 9 years ago. It is an unusually productive tomato and very satisfactory in most soils. Mr. Miles took the Hummer and crossed it on the Masters and here is what he got. I wish you could see those plants in the field where you can look down on the tomato plants and see 40 or 50 ripe specimens one one plant, where it has not been picked, the first of September, and everyone of them perfectly round, smooth and sizable tomatoes. This shows a crate of tomatoes in the college greenhouse. We have found that the Globe and Bonny Buster were the most satisfactory varieties for growing under glass. Now going out to the fields again, one of the most important experiments we have made is with asparagus and the next picture will show the result of this work. I don't think you can read the figures back there, but I wanted to stop long enough to tell you just what this means. We have made the experiment with two varieties. We made the planting seven years ago and graded the roots into three different sizes, large, medium and small roots. The interesting thing about this experiment is that the small root and small plant that came from those small roots have never caught up with the medium size and that the medium sizes have never caught up to the large ones. Let's look at the returns first. This represents the largest root. We made the first harvest in 1910, and those roots produced at the rate of $160. to the acre. Now, with the medium sized root, the No. 2, the yield or returns were considerably smaller, with one or two exceptions. The first year we got a little more from No. 2 roots, but from there on the No. 2 returns were smaller. Now, you will note down here that on these small roots the showing is still more marked, but you will note that those small roots have never caught up with the large ones. If you want to grow asparagus and want to plant 1,000 roots, grow the 3,000 yourself from selected seed, select 1,000 out of the 3,000 for planting, and your returns will be large.

Now, a little about our orchard experiments. We saw awhile ago that in certain orchards of Pennsylvania, manure can be applied to better advantage than anything else, and in other orchards, commercial fertilizers. In this experiment in Warren county neither money nor effort has made any appreciable showing. In this orchard, which is in Lawrence county, during six years, nitrogen and phosphoric acid has given increased yield, or has given a yield of 305 bushels to the acre. You will note here that those trees on this side have been fertilized with nitrogen and phosphoric acid and those other trees have not been fertilized. These trees are evenly loaded with fruit, while there is practically no fruit on this side. The results have been unusually striking in Lawrence countv, showing the value of nitrogen and phosphoric acid. This experiment in Bedford county—the results have been equally striking or practically so. We have harvested 335 bushels in the seventh year, to the acre, showing the result of nitrogen and phosphoric acid. This is a Baldwin tree seven years of age. We topworked it on Northern Spy and at the seventh year picked a bushel and a half from the tree. Now, we wanted to draw out here a few lessons, which I think are of unusual importance to Pennsylvania fruit growers. Between those apple trees we are growing potatoes. In the experimental orchard at State College, on limestone soil we have found out that the apple trees, Baldwins, Stamens, Winesaps and some other varieties, that the apple trees have been growing where we are growing potatoes between the rows, have made 12% better growth than where we have followed the most approved method of orchard management. I mean by that, plowing in the spring, harrowing until midsummer, and then starting a cover crop, plowing that down the following spring, and keeping that up year after year.

Now, that is not all of the story. These potatoes, or beans and peas, as we have used sometimes, have returned from $50. to $75. to the acre. Now, of course, we cannot utilize all the ground, and these figures are very conservative. Limestone soil is not a good potato soil, and having a good potato soil you should do much better, but our returns have been $50. to $75. to the acre. That means that the farmer growing crops between his trees will more than pay for the expense of that orchard while it is coming on and make a profit out of potatoes besides. I am sorry that I cannot show you a part of the orchard showing the trees mulched. The finest apple trees in this young orchard at State College are where we have mulched them every year heavily with straw. Those are the finest trees in the orchard. These trees are better than any other trees, even those where we have gone through the potatoes, where we have planted cover crops. I have to make one exception, where we have grown alfalfa, taken the alfalfa and mulched the trees, we have gotten better growth there than where we have mulched with straw, and that is due to the larger amount of nitrogen added to the trees. We have a cover crop of vetch, one of our best cover crops in Pennsylvania, certainly on limestone soil, where we have been making this experiment. Soy bean is also very good and certainly better on a limestone soil than cow peas.

There is another lesson I want to bring to you; we referred to alfalfa a moment ago as being desirable to grow in young orchards. The best trees in that orchard are where we have grown alfalfa, mulched the trees with alfalfa so heavily, that the moisture is conserved more perfectly than in uncultivated areas. There is one other lesson—it is possible to grow a surplus of alfalfa in that young orchard which can be sold or used as hay; in other words, the growing of alfalfa in the young orchard is worth considering as a business proposition, aside from the growing of strong, vigorous young trees. I think that these are the most important lessons that can be brought from our experimental work with fruit trees. There is a picture showing some experiments with ground rock on peaches. We found that some of the commercial preparations recommended for the spraying of peach trees are decidedly injurious and should be used with great care. The trees must always be protectd from mice. We keep the straw away from the tree a little way, but if you will use wire collars to keep the mice away, it is certainly very successful.

A Member: They get under the protection and eat at the roots.

PROF. WATTS: We have not experienced that trouble at State College so far as the growth is concerned. That certainly is a verv satisfactory plan. This general conclusion might be drawn, that that plan of orchard management is best, so far as the tree growth is concerned, which conserves the moisture most perfectly. It is a moisture question very largely. Now for a few pictures. We have here our new stock judging pavilion, which is heated comfortably and used all the year through in the stock judging work. It shows an interior view of the pavilion, with chairs all around and seating capacity for 800 people. We have here a group of cattle used in the feeding experiment. We have found that the most economical ration is silage, and 2½ pounds of cotton seed meal per 1,000 pounds of livestock. That is better than where the cattle are given corn fodder and hay for the range. Silage must enter into the ration if you want to feed beef cattle economically and get the best results. Of course, we use different combinations, but we have one lot every year which receives no other roughage but corn silage and 2½ pounds of cotton seed meal per 1,000 pounds of live weight. Our herd of pure bred breeding cattle is treated in the same way and we are not able, at this time, to see any injurious effects from that kind of roughage, only I think most farmers would prefer mixing in a little clover or alfalfa or some other dry roughage, but the results have been very satisfactory at State College.

This shows a low constructed shed for sheep, very inexpensive, yet one which works out very nicely, built on the south side of one of our barns. This shows one of our Berkshires on a blue grass pasture. We are also making some experiments on the Spring Creek Farm, and here the hogs are having a real good time pasturing on oats and Canada field peas. Now, this looks like a sort of a hoggish trick, to turn the hogs into the corn, but they make a good job in harvesting it, they don't waste very much, and another curious thing is that these hogs made gains a little faster than the hogs where they were fed corn carried to them every day. That plan, of course, is more popular in the West, I presume, than it ever will be in Pennsylvania. This shows some of our sheep pens used for hogs down on the lower farm; they are a sort of portable pen. Here is a herd of some of our steers on Spring Creek Farm; pure bred steers. I want you to note there the character of land, the rough, rolling land. A great deal of this land should not be farmed, though it is not as steep as much of the land which is in tillage in Pennsylvania. We are doing everything we can to encourage the livestock industry. We believe that too much land in Pennsylvania is farmed too intensively, that there are thousands of acres on the steep hillsides that should be put into grass and grazed rather than plowed and farmed in an intensive way.

A Member: Do you ever fertilize that hill land?

PROF. WATTS: We are making some experiments and it responds quickly to the application of commercial fertilizers or manure. We have a field, which, when we bought it three years ago, was very weedy. The weeds have disappeared and it is getting better all the time, but probably it would pay better to fertilize that land with fertilizers or manure and then put cattle in it. I want you to note these cattle which have come down into this stream on a hot summer day; it is a pure stream that comes from the mountains and it is one of the best things we have at State College, this pure stream of water for our livestock. That shows a lot of steers which were being prepared for the International Show. We have one of the younger animals, a very good animal here. This shows our herd of pure Angus. Here you get a better idea of the character of the land. This over here is very steep. That is taken down on the lower part of the farm about three miles away from the college building. They make a beautiful appearance, these black cattle on the pasture. Every one of these cows that you see here had been wintered for several years on corn silage only as their roughage and came out of the barn in the spring fat and round as rolls of butter. Here we have a bull that heads the short horn herd. I want to show you now a couple of pictures of a couple of Herford steers, very nice animals. This is another specimen. We buy a carload of horses almost every winter and conduct a fattening experiment, a feeding experiment on different methods of feeding horses and preparing them for market. This shows some of these animals; they are all western animals and we get some very good ones among them.

A Member: Are the farmers that visit the college grounds allowed to feed cattle?

PROF. WATTS: They are permitted to see the cattle out on the pasture, but we are not allowing them to enter the dairy barn. I don't know just when we will take the quarantine off, but we have so many cattle there and we have kept the record for so many years that we feel we would be taking chances to take the quarantine off the dairy barn. They just had a new outbreak of foot-and-mouth disease in Philadelphia recently and we think we are justified in keeping the quarantine on the new dairy barn.

A Member: In which way can you make the most economical gains on your feeding of stock in winter, in open sheds or barns?

PROF. WATTS: According to our experiments at State College, the use of corn silage only as roughage and then of course as the time approaches to put them on the market, the use of cotton seed meal, if we don't use cotton seed meal, they will have more or less bowel trouble, and this seems to be necessary to maintain the good health of the animals.

A Member: My question was, can you make the greatest gain in open sheds fresh air or when they are confined in a barn.

PROF. WATTS: I did not catch your question. All of these animals are kept in open sheds, we do not believe in confining any of the big beef cattle to closed houses and I doubt whether it is best to keep the dairy cattle in. Our new barn is so well ventilated with windows that it is practically outdoors. I believe experiments have been made which show that even the dairy cattle will do as well in open sheds as in the closed stable, but that is a little out of my line.

I want to show you just two pictures showing the type of work done by the Department of Botany. Here we have the brown rot on the peach and the next tree shows the mumified fruit under the tree. That will be controlled by proper spraying. Now we want to show you a few pictures of the Agronomy Department, then we will be through. You have all heard of the fertilizer plots of

State College having the longest continued fertility experiments of any state in the Union. On the left where you see these three piles of hay, three piles on each plot, over here this plot has received burnt lime at the rate of 4,000 lbs. to the acre every fourth year. That plot has also received 6 tons of manure every year in rotation, a four year rotation. This central plot has received lime only at the rate of 4,000 lbs. to the acre every fourth year, while this plot has received nothing.

These experiments have been in progress for 33 years. We haven't time to stop to draw all the lessons that might be drawn from these experiments. One lesson is that lime in large quantities alone will do no good whatever as a long term proposition. There are former attempts to use lime which show that it does not maintain the supply of organic fertility in the soil. There will be no benefit whatever from it, because the crops on this farm where nothing has been applied for 33 years are practically just as good as on this where lime has been used. We also learn that the use of any fertilizer which keeps the soil in a highly acid condition is undesirable, that the judicious use of fertilizer on this land will maintain fertility and result in crops just as satisfactory as where manure has been used. Now that is a strong statement to make, and yet we can back it up. A few years ago farmers came down and looked over the fertilizer plots and they would go down the alley and look at this plot and say "There is a fine plot; how has it been treated?" "Why, we used manure and lime on that land for 30 or 33 years." Then they would go down and say "Here is a plot that looks just as good, how have you fertilized this?" "We have used commercial fertilizer on this plot." "No manure, no lime?" "No, no lime; nitrate of soda has gone into that plot and helped to keep the soil sweet." Then the farmers would say, "That's all right on a little plot of land but it won't work on a big farm." They used to say that to Dean Hunt, so finally Dean Hunt said, "All right, let's try it out on a big farm;" so he went across the road and rented a farm. We have been farming that land five or six years and I want to say that we are handling that land successfully without manure; there is no manure used on that farm and hasn't been for five or six years. We harvested there year before last over 30 bushels of wheat to the acre, threshed out 37 bushels last year and the fertility is being maintained by the use of commercial fertilizers and lime.

Sometimes we are taken to task for calling attention to this experiment on the Mitchell farm. Last year a banker, very much interested in the development of agriculture in this State said, that we were making a big mistake. I told him we had no right to keep that fact from the farmers of Pennsylvania. While we want to encourage the livestock industry because it is one of our most important things in Pennsylvania, yet every farmer should understand that by the judicious use of lime and fertilizers he can increase the productiveness of his farm and increase his earnings. It does not necessarily mean that Pennsylvania is to abandon the keeping of livestock, but it does mean that every man should study the use of fertilizers and lime and that the productive power of a limestone soil can be maintained by the use of fertilizers and lime.

A Member: Could you produce that wheat at a profit?

PROF. WATTS: Yes, the wheat was produced at a profit. The experiments have not been conducted long enough to answer that question as definitely as I would like to at this time, yet we do hold figures on the comparative cost of production on these fertilizer plots and the manure plots.

A Member: Was any humus injected into that soil?

PROF. WATTS: Only as it came into rotation from the clover that might be left on the ground and from the corn, wheat and oats.

A Member: What is the rotation?

PROF. WATTS: On the farm plots, corn, wheat, clover and oats; on the farm it is wheat, clover and corn.

A Member: In cutting the wheat, did you take any pains to leave lots of the straw while they cut?

PROF. WATTS: No, not at all; cut it in the usual way.

A Member: What kind of lime did you use?

PROF. WATTS: Well, we used different forms of lime; ordinarily just common burnt lime.

There is another man to follow me, so I will have to hurry. I simply want to show you a few samples of corn, unusually fine ears, champion at one of the corn shows; that shows a selection of a number of very good ears; that is a dent variety, I don't know the name. Here is an exceedingly interesting experiment showing 30 some hills of potatoes, all selected from one plant; you can see what a tremendous difference there is in the result from these plants. I want to say that we have made decided progress in hill selection. Now we have a timothy garden which is exceedingly interesting, showing the variations in the timothy; and this breeding work I believe will result in great value to the State. It is being carried on at Cornell University, and this next picture will show what is happening at State College. The best plot here of this pure bred timothy has yielded at the rate of almost half a ton more to the acre than the ordinary timothy which we find on the market. We hope to have this seed before long to send out in small quantities to farmers to try out. We are also making a variety of experiments with wheat, corn, potatoes and oats.

Now, then, I don't believe that this slide has ever been shown away from State college. We have not said very much about our selected work, but I do want you to know that Mr. Nolden's Department of Agronomy is doing a great work along the line of selection. We are working with three different varieties. Now it is an experiment to determine the value of selection, picking out special plants and breeding them until you have enough that is worth while, and we have some that are worth while. Take Reliable, for example; it yielded 32.1 bushels to the acre, while selections which have been developed at the college have run 37 and 38 bushels to the acre. Notice Golden Sheaf; the normal yield of the variety as we started it was 37 bushels to the acre; our selections run 44 and 45; and down here with the Pulcaster the difference is even greater; the normal variety ran 30 bushels to the acre and our selections ran 35 and 40. We think that work is going to be valuable to the wheat growers of Pennsylvania and will soon be in shape to put the results before the people in a form that will be worth while. Now you will note that each of these ears of corn are numbered. Will someone from the audience tell me which is the best ear? Can you see the numbers.

(Some of the audience selected No. 82 and others No. 80.)

PROF. WATTS: Now the point I want to bring out is that these ears of corn represent an ear to the row test; the figures below are not the numbers but represent the yields which have been produced by these different ears on the average basis. How about this ear? Does that look good? You don't like the looks of that, do you? That ear produced 81 bushels to the acre yet you would not think of selecting that for the corn show. Whoever picked No. 82 made a good selection, because it produced 82 bushels of corn to the acre, yet it is not a very good ear for the corn show. Over here is an ear that does not look so bad, in fact it is a much better looking ear than some of the others, and yet that produced only 55 bushels of corn to the acre. The lesson is this, that you cannot tell from the looks of an ear of corn what it is going to do when it is planted; the only way to find out is to make an ear to the row test. Corn is just like people, you cannot always tell by the looks of a person what there is in them, and so it is with corn.

(On account of the cold weather and inability to heat the hall, the meeting then adjourned until Thursday, May 27th, 1915, at 9 A. M.)

Thursday Morning, May 27, 1915, 9 A. M.

Mr. J. T. Campbell in the Chair.

The CHAIRMAN: Now, my friends, the time is here for opening the session this morning and I hope you will all make yourselves as comfortable as possible and we will try and have a good session. I believe Mr. Martin has a word of announcement the first thing.

DIRECTOR MARTIN: Friends, I am in receipt of a letter from the County Chairman of Jefferson county sending his regrets at his inability to attend on account of the serious sickness of Mrs. Cowan. Mr. Cowan sends his kind regards to all the friends. I also have a telephone message from Mr. De Witt who took sick on the way here. He is in the hospital at Meadville. His condition is not considered serious, and yet he is quite a sufferer there. He also sends his regards to the workers. This condition of weather, as you know friends, is one over which we have no control. If we thought we had, we would tackle it, but we don't have, and we are made of that kind of fibre that we make the best of all situations and all circumstances. The hotel people have kindly offered us this room in which we can at least be comparatively comfortable, as compared with the auditorium, and we deem it best at this time that we take up for consideration, first, the remainder of the program for yesterday evening, Prof. Cooke's illustrated address, and then after that we will drop the Institute session until this afternoon, awaiting the appearance of Mrs. Morgan and the other lady who is on the program. If they appear by noon, we will then take up that part of the program this afternoon, so that if circumstances will cut us off with the additional session, we will be compelled to omit the institute sessions you see here; so the first will be the illustrated lecture, as Mr. Campbell has said, by Dr. Cooke on "The Relation of Birds to Agriculture."

THE RELATION OF BIRDS TO AGRICULTURE

By DR. WELLS W. COOKE, *U. S. Department of Agriculture, Washington, D. C.*

Mr. Chairman, Ladies and Gentlemen: The question of the relation of birds to agriculture is something which has taken up a good deal of attention in the last few years and has at last, after many years of agitation, finally been taken up by the United States Government; and it was in connection with my work under the Federal Migratory Game Bird Bill, the bill for protecting migratory game birds and migratory insectivorous birds, that the material was obtained which I want to talk to you about this morning.

Now we will start right out with the slides. I wish I could say that all birds were beneficial. If I could, why that of course would end the discussion. But unfortunately, some birds are not beneficial, although very fortunately the number is a very small part of the total number of birds. We have here in Pennsylvania about 375 different kinds of birds, and out of those we can say that only three are entirely injurious. One of them we have on the screen now, the great horned owl. Its food is quite largely the beneficial bird. It is given here with a quail in its claws, although I think that the painter, when he put that there, rather stretched the facts of the case. I don't think that the great horned owl ever does much injury to quail, but the next one we have on here, Cooper's hawk, is shown with a quail in its claws because that is probably the worst enemy, next to man, that the Bob White has. The Cooper's hawk comes down in the field, and if he finds a covey of quail he is pretty apt to stay right there until he has taken the last one of them. The sharp-shinned hawk, which is very much like the Cooper's hawk, only a little smaller, is the third one of the three kinds of birds we have in the State which may be considered as entirely injurious. But I don't want you to consider that because these birds that I have mentioned as injurious are hawks and owls, that, therefore, all hawks and all owls are injurious; on the contrary, the hawks and owls are among the good friends of the farmer and we have had one experience at Washington which showed this very plainly. A pair of barn owls lived in the tower of the Smithsonian Institution and a man there in Washington in our office took it on himself to find out what those owls were eating. An owl does not tear up its food very much, it swallows it almost whole, and then the bones and hair, the indigestible parts, are thrown out as pellets from the mouth and these pellets accumulate in large numbers where ever the hawks roost or nest, and this gentleman went up in the tower of the Smithsonian Institution and gathered up these pellets to see what these owls had been eating and he found that those pellets were composed almost entirely of the bones and hair of mice. He counted the heads of over 700 mice in the pellets from that single pair of owls in that one winter, so you can see how largely they have been working for man's benefit. The two hawks on the screen there now, the red tailed and the red shouldered, are those that are commonly called the hen hawks, and yet they do not deserve that name. It is very seldom indeed that either of those, which are our largest hawks, take anything in the poultry line. Their food is the smaller mammals, mice. The sparrow hawk, our smallest hawk, receives that name, sparrow hawk, simply because it is small. It really does not eat sparrows, its food is very largely grasshoppers during the summertime and mice in the winter.

Then we come to the group of sparrows which are pre-eminently the seed eaters, and yet we have one exception. Sparrows are beneficial with just the one exception of the English sparrow, and unfortunately it happens that it is the most numerous of all. I had expectd when we made a bird census last year, a census of the birds of the United States, that we would find the English sparrow to be the most abundant bird in the United States, and I was quite surprised when the returns came in to find that the robin exceeded it. Judging by the census of last year, the robin is the most numerous bird in the United States. To us who live there in Washington that seems a little queer, because robins with us are rather uncommon through the summertime; they are almost a rare bird in the breeding season, and coming up here yesterday, I noticed particularly as I got north of Pittsburgh and up into this northern part of the State how numerous were the robins. The train scarcely passed a farmhouse anywhere without my seeing from two to four or five pairs of robins. It seems queer that the English sparrow should have been brought to this country, because it was brought to rid the trees in Central Park, New York City, of the worms that were destroying them. Well, the sparrows never did eat those worms, they never would, they are insect eaters but they found here a climate that was congenial, they found plenty of food and they have multiplied until now they extend from ocean to ocean and have become, as I said, almost our most common bird. And yet I was glad to see, a few years ago that even the English sparrow could do some good. We had there in Washington an attack of the seventeen year locusts and they were very abundant, just a hum all day long, and from the time those locusts came out of the ground the English sparrow practically gave up all other food and devoted itself to the seventeen year locust. It would fly up in the trees, grab a locust, bring it down to the ground and it seemed to recognize that if it ate the whole locust it would get filled up too soon, so it would just grab it by the head, pound it up and down on the pavement, pull off the head, eat that, leave the body and get another locust. It must have killed thousands and tens of thousands of locusts, so there is one good deed you will have to credit to the English sparrow.

The crow I suppose has been the cause of more profanity than any other bird in the State of Pennsylvania, and yet I doubt if even the crow is quite so black as he is painted. He does like to pull up your corn and has been accused, and I guess rightfully, of stealing eggs out of birds' nests and taking even the young birds, but there are two sides even to the crow question. You take it along in the spring when the young crows are just growing and they have got tremendous appetites and keep those old birds hustling all day long to fill the mouths of those young crows, which are fed quite largely on the white grub of the larva of the May beetle, which is one of the bad insects or bugs on the corn or strawberries, in the grass patch and then later on in the season when the young are full grown, both the old and the young feed quite largely on the grasshoppers; so you see there are two sides even to the crow question.

I suppose the robin has been the cause of more discussion than any other one bird. I remember once we were having a meeting down at Lancaster and I had been talking in favor of the birds and a man got up and said, "I want to register a protest against the robin; it does us a great deal of damage in our fruit." When he sat down, another man got up and said that that was just his experience exactly. It is only a little while ago that the people in New Jersey, the fruit growers in New Jersey undertook to get the New Jersey laws changed so as to allow the killing of robins; but the friends of the robins proved more numerous than the fruit men and succeeded in keeping the law on the statute books that prohibits their killing. I think the worst hard luck story I have ever heard in regard to the robins comes from California. A gentleman went out into one of those valleys up in the foothills of the mountains and set out a fruit orchard and the land proved favorable, all the conditions were favorable, the trees made a good growth and when they came into bearing, he expected to receive a good return on his investment. It happened that the first year that the trees were in full bearing there was almost an entire failure of the native fruit upon the mountains above him, and the robins that ordinarily would live on that native fruit and that much prefer the native fruit, if they have their choice, came down on to his orchard and cleaned out everything as fast as it ripened. Naturally he was very wrathy and he went down on the lowlands and went around among the orchardists there and tried to get them to unite with him in a petition to the Legislature to have the law changed so that they could kill the robins, and he could not find a single person who would unite with him in that campaign. They said, "We know they have taken some of our fruit, but we have become convinced that on the whole they do us more good than they do harm." The food of the robin has probably been studied more carefully than that of any other bird, and it has been found that while it does take some fruit, yet, when the young are in the nest, those young are fed almost entirely on insect food, and the amount of food that a young robin takes is almost beyond belief. It eats more than its own weight of food every day. Now just think what would happen in this hotel here, what this proprietor would think, if you folks should undertake to do that. And as I said, that food is almost entirely insect food and that comes at the time of the year when our crops are growing fastest, when insects are most numerous, when the insects are doing the most damage to the crops, so that the birds help us most just when we most need their help.

There is another bird, the woodthrush, on the screen here now, whose food and habits are practically the same as those of the robin, and I just wanted to show the results of that large amount of insect food that the birds take. The bird from the egg to this stage is about four or five days and in about the same amount more, that is in about ten or eleven days from the time the egg is hatched, the birds have become old enough to get out from the nest, so you can see the very rapid growth that comes from that very large amount of insect food that they take.

The bluejay is another one of our birds about which there has been some discussion. Personally I have known bluejays all my life. Where I was raised in southern Wisconsin, we had them in our yard; they nested there; we had them there all the year through and I never saw the least signs of any trouble of the bluejay with the other birds. There were plenty of other species nesting right around there They were all on good terms, and yet reports come into our office every little while of bluejays doing damage.

The bobolink is a bird which used to be counted as one of the injurious birds. It has been a little queer in conditions of affairs there. Years ago when South Carolina was the principal rice growing state in the United States, there is no doubt that the bobolink did a good deal of damage. The bobolink winters down in South America, way down in Brazil, and sometimes in its northward migration it gets up into Florida and South Carolina about the time the rice is coming up in the spring; but it does not do much damage then, but passes on up and comes for nesting to this part of Pennsylvania and northward.

I was out a few minutes yesterday afternoon around the fields here, and I found a good many bobolinks were present here now—it is called bobolink up here; with us, in Washington, it is called the reed bird, from its habit of staying in the reeds at night; and down in the Southern states it is called the rice-birds. It nests from northern Pennsylvania and southern New York northward, principally in New England and the northern states up into southern Canada, and throughout all that region it is one of the best loved of the birds. It is one of the finest singers we have and throughout all that region it is very carefully protected both by law and by custom and a man would no more think of killing the bobolinks on his place than he would the dog or the cat, and so it has a care-free existence. Through the summer it raises a good family, and when the young are full grown, those small family parties unite into larger parties, and those into still larger as they move toward the south, and by the time they get into the Southern states they have assembled into very large flocks. And as I say, years ago when South Carolina was devoted to rice growing, the bobolinks were very injurious on those rice fields; they used to get down there in the fall migration when the rice was in the milk. Rice grows on the top of a stalk like oats and the bobolinks, settling down on those rice fields to eat the rice, would settle on the stalks and their sharp claws would pierce the grain and let out the milk and they actually did more destruction with the claws than they did with the bill, and at first, in the early days, the rice growers used to try to kill them but they found they were too numerous for that and they have devoted their energies just to making a noise to keep the bobolinks in the air; they station the little darkey boys in the fields with guns to fire them off and make a noise and keep those bobolinks in the air and you can get some idea of their numbers from the fact that one planter in one year used up five tons of gunpowder, 10,000 lbs. of powder, just for keeping those bobolinks in the air off his rice field, and it was estimated that when they were at their worst they did a damage of $2,000,000 a year.

Well now that has practically all ceased. South Carolina has ceased to be a rice growing state, and though the bobolinks go back and forth over that state as they did before, the investigation made by our office a couple of years ago failed to show any particular damage that was done by that bird. The amount of good that a bird can do depends, of course, principally on its habits; but also on the time of the year that the bird is with you and the two kinds of woodpeckers given here, the smaller one below, the downy, and the larger one above, are our best conservators of tree growth. They are with you all the year and their food consists almost entirely of the insects that would be injurious to the trees.

And here is another little bird, a great favorite of mine, the little chickadee, that is also one of the beneficial birds. It is small, it spends its time around in the trees, and through the winter time particularly, lives very largely on the eggs of the insects that it finds secreted in the cracks and crevices of the bark.

The cuckoo is not a very handsome bird, but he has the habit of that toad that was spoken of by the speaker last night, of taking little hairy things. Its particular food that it likes especially, is the hairy caterpillar. It is almost the only one of the birds that will eat those caterpillars, and I have been interested there in Washington to see how the habits of the bird has changed owing to an incursion of these caterpillars. The cuckoo is naturally a very retired bird, found out in the thick woods, but of late years the maple trees in the city of Washington have been attacked by the Tussock moth and the cuckoo has come out of the woods and come into town to eat those caterpillars of the Tussock moth, and we find them more commonly around the streets of Washington than I have ever seen them anywhere out in the woods.

I said in the beginning that persons had become convinced that birds were not receiving the protection that they deserve, that protection under the State laws was not sufficient and that it was necessary to get Federal law on the subject. The agitation for this began several years ago and as soon as the campaign was fairly under way the people in charge of it were quite surprised to find that a large part of the gunners of the United States came over to their side. They had taken it for granted that they would have to fight against the hunting part of the community, but the hunters had awakened to the fact that the game birds were becoming lessened in number; the wood duck was one of the ducks, one of the game birds, that showed most conclusively that the laws were not strict enough, and so by the help of the gunners they were able to get through this Federal law.

The woodcock was another of the game birds which showed a very alarming diminution in number. This picture of the woodcock on its nest was taken at Washington. A man of my acquaintance found the nest, and by approaching very carefully, without alarming the bird, was able to walk up to the nest and stoop down and stroke the back of the sitting bird, while another friend took the photograph. So you can see what a very persistent sitter the woodcock is when the eggs are very near hatching.

When this Federal Game Law passed, it was almost the last official act done by President Taft, the signing of that Migratory Game Bird Law, just a few hours before he went out of office. That law covered migratory birds. It was found that Congress could not pass any other kind of a law. A bird which lived all the time within the boundaries of a state had been declared by the highest Court over and over again to be the property of that state and not subject to Congressional action, so that the only kind of a law which Congress could pass was one that would have effect on the migratory birds, those which passed from state to state, both in the game birds and the insectivorous birds. It happened that the carrying out of the provisions of that law was put in the hands of the Department of Agriculture, and I was one of the committee and still am, that has charge of the carrying out of the provisions of that law, and one of the first things we had to do after that law was passed was to find out what birds would come under the provisions of that law, what birds were migratory and what birds were not, and that has occupied quite a little of my time for the last two years.

The bird on the screen here now, the cardinal, is one of the best examples of an absolutely non-migratory bird. You do not have it as far up in the State as this, but it does come up just about to Beaver. It is quite abundant in southeastern Pennsylvania. As I say, it is an example of the bird which is absolutely non-migratory. Most cardinals are hatched and live and die and never go ten miles from the place where they were originally hatched.

The screech owl is another example of an absolutely non-migratory bird, staying the entire year right within sight of the home spot.

The goldfinch is another example of a non-migratory bird, with this difference—most people know the bird through the summer in that upper plumage there when it is black and yellow, but in the wintertime, the bird changes to another plumage represented by the lower bird, and a good many people that are familiar with the summer bird do not know it in that winter plumage; but the bird is here all the year.

Then we come to a series of birds—I have three or four of them—which are just on the dividing line. The meadow lark with you up here would be a strictly migratory bird; with us in Washington and up as far along the coast as New York City, it is on the dividing line between migratory and resident. We have meadow larks with us at Washington all the year, though it is not probable that any one meadow lark stays there all the time. Our summer meadow lark goes south for the winter and their places are taken by meadow larks that come in from the north. But you see the legal point is this, that if we should undertake to arrest a person for shooting a meadow lark there under the National law, he could claim that that particular meadow lark that he shot was one that had stayed there all the year and consequently did not come under the Federal law, and we could not disprove it; the burden of proof would be on us to prove that that particular bird was migratory and we could not do it. The same applies to the red winged blackbird, although 95% of the red winged blackbirds are migratory, yet last winter, for instance, we had a few that stayed right through the entire winter, so that although up here they would certainly come under the migratory law, it would be a disputed point with us. And the same applies to the flicker, those birds which are most of them migratory, but a few individuals stay through the season.

Among the earliest migratory birds to come to Washington is this brown thresher, and I take that particularly because that is a photograph from one of the most celebrated of Audubon's plates, the brown thresher being attacked by a blacksnake and the other birds coming to the rescue.

Among the migratory birds that come down from the north and stay with us through the winter, is the golden crowned kinglet, so named from its crown. Among the real migratory birds is the redstart. That is as good an example as you can get of the common bird showing the three plumages, the full adult male at the top, the adult female in the middle and the lower bird is the one year old male which has the white throat of the female but shows a few feathers of the black coat which it is going to have next year. The Baltimore oriole is an example of a strictly migratory bird, going outside the United States for the winter and returning for the summer, and the same is true of the indigo bird, which is also shown with two plumages. The male and female scarlet tanager is one of the best examples and I wanted to show that particularly on account of the changes in plumage.

Probably all of you are familiar with the bird, the upper one there, showing the fully adult scarlet tanager in the full plumage; the one at the bottom is the female; the one in the middle is the male in the transition period. The scarlet tanager nests in this part of the country and all through the eastern part of the United States, and then in the fall, as soon as the young are fully grown and out of the way, the male begins to change its plumage from the scarlet and black to a plumage like the female; that is the greenish yellow, except that it keeps the black wings. It goes down to South America for the winter and winters there in that greenish yellow plumage; then as it comes north in the spring, it begins to shed those greenish yellow feathers and gets the red and as it comes into the Gulf states of the United States in the spring, it is like this middle colored bird, just changing from the greenish yellow to the red. By the time it gets here, the greenish feathers have all dropped out and you have the scarlet and black bird you are familiar with.

The chimney swift is another migratory bird and apparently interesting from the fact that it is the only North American bird whose winter home we do not know. We have in North America about 800 different kinds of birds, and we know where everyone winters except the chimney swift, and it is one of our most abundant birds. We can trace it in late September and early October as it goes south and gets down to the Gulf states about the middle of October, and then it disappears. It could not disappear any more thoroughly if it was true, as used to be thought, that the chimney swift went down into the water and hibernated in the mud at the bottom of the ocean and the Mediterranean Sea; that was the old idea, and they could not disappear any more thoroughly if that was the fact and then five months later, along in April, they come back in their full numbers; but we do not yet know where the chimney swift spends the winter. I had a most interesting experience with these chimney swifts a few weeks ago. I was up at Harper's Ferry and over on the bank of the Shenandoah, opposite the town, I was there about six in the evening and happened to look over towards Harper's Ferry and I saw a large number of swifts circling around the town. I knew that meant that they were intending to spend the night in some chimney in the city, so we watched them there for a while and then concluded that we would go over nearer to them. As we started across the bridge, those circling clouds began to drop down into the chimney of one of the churches there which was right in plain sight and a great number of the birds went into that chimney while we were crossing the river. Then we went over till we were near the base of the chimney and I said, "We will stand here now and count as well as we can the rest of them that go in." The numbers had been increasing all the time by recruits and we got where we had a perfect view of the birds as they would drop down into the chimney and although I could not count them exactly, yet I tried to have my count lower than the truth rather than above, and we stood there for about an hour and a quarter, while those swifts were going into that chimney, and my count was 4,700 that went in. We estimated that a thousand had gone in while we were crossing the bridge; and, as I say, I thought my count was under the truth rather than over, so that the probability is that there was something like 6,000 swifts that roosted in that one chimney and it seemed to be a pretty small chimney.

Now that is a pretty big story. I was talking on birds there in Washington early this spring, and up to that time the largest number—I had seen the swifts go into chimneys a good many times, but the largest number I had counted was about three thousand, and I told them this same story about the swifts circling around and going into that chimney, only I put the number at 3,000, and I have heard from that from all directions since that time. It comes to me something like this: A person says, "Why, I liked your lecture, but when it was so good, why did you put in that nature fake about the 3,000 swifts going into the chimney?" Well you see I have just doubled it, I have got it 6,000 now.

The birds in migrating from eastern North America to their South American home—and there are something over 100 different kinds that make this migration—do not take what would seem to be the natural course. Suppose birds from eastern North America are going to winter down here in South America, you'd think they would come right across through here, across the West Indies and Cuba. That route is taken by a few birds. The bobolink goes across there and it is the most common bird that does. Then there is another course down through the islands that a bird could take and not be out of sight of land the whole day. We don't know of any bird that takes that course. The great bulk of the birds cross the Gulf of Mexico, right at its widest point, coming along through the eastern United States, going down the same general course, the trend of the coast, through western Florida and then across the Gulf and down to Central and South America, and that requires a flight of 700 miles across the Gulf of Mexico, and it is made in a single flight and in the night time. The birds start soon after dark, fly through the night and reach the other side just before daylight, and they are not tired by that trip, if they were they would not take it because they don't have to, they could go around, and we have proof that they are not exhausted by it because, in the spring, when the birds return, there are a great many hundreds and thousands of them that fly across from the southern shore, do not alight when they reach the coast of the United States, but fly all the way from 100 to 200 miles inland before they alight. There is one line out here, this route marked No. 1, which is a straight shoot from Nova Scotia straight south to South America, which of course would be the shortest route. There is no land bird that takes that route. Take a common little summer warbler, one of our commonest birds; it nests here, abundantly and winters down here, but instead of going across, it goes around nearly 2,000 miles out of its way; but there are some of the water birds that do take this route.

This bird and the golden plover is one of the best known birds that takes that migration route. This shows the two plumages, the black breasted, the breeding birds' summer plumage, and the white breasted, the winter plumage, and that bird does take that route across the ocean. It nests way up here in the Arctic, along the coast of the Arctic lands, then as soon as the young are full grown, both the old and the young come out here to the coast of Labrador. There is a berry there called the curlew berry which grows in great profusion over the Labrador rocks. That bird is very fond of them and the birds stay there several weeks, gorge themselves full and get ready for their great flight. Then they come down across the Gulf of St. Lawrence, out here to Nova Scotia, and then start on this straight flight across to the coast of South America. It is about 2,400 or 2,500 miles that they fly, and they make that entire trip without a stop, providing it is good weather.

I told you that the birds flying across the Gulf of Mexico made the flight in a single night. But it would be impossible for the golden plover to make that 2,500 miles in a single night, because birds, when they are migrating, are not flying at their fastest, probably about 40 or 50 miles an hour is as fast as they ever fly in migration, and at 50 miles an hour it would require two whole days and nights of flying to accomplish that. Just think what that means,—flying continuously for two days and two nights without a particle of rest. The plover is not a bird which could light down on the surface of the ocean and then start again; it has got to keep going continuously for that 48 hours. And yet we have reason for thinking that the bird even in that long trip is not exhausted because, if it was, it would not take it, it does not have to, it could just as well go around by the coast but it takes that long flight from preference. I had some curiosity to see how the plover compared as a flying machine with the best that man has yet been able to make in the form of an areoplane. The fat in the bird's body is the fuel that is burned up to make the force that carries that bird on this long flight, and we know that that plover has at the outside not more than two ounces of body fat which is used by it for that 2,500 mile flight. Well, if an aeroplane was as good a flying machine as the birds, then a thousand pound aeroplane would need for making a 20 mile flight only one pint of gasoline.

I wrote to the officer at Fort Meyer who has charge of the U. S. army aeroplane and asked him what was the best that their machines had yet been able to do, and he wrote back that 1,000 lb. aeroplane for 20 miles would require a gallon of gasoline; that is a gallon for the machine as compared with a pint for the bird. In other words, the bird is eight times as good a flying machine as the best that man has been able so far to do.

The golden plover has a migration route of about 8,000 miles, but the one on the screen here now, the Arctic tern, has the longest migration route of any bird in the world. It nests way up in the Arctic; it is well called the Arctic tern because it nests just as far north as there is anything solid on which it can build its nest, and then it winters just as far south in the Antarctic as it can find any open water from which it can get its food. It lives on fish, so that no bird can have a longer migration route than the Arctic tern. It is about 11,000 miles from its summer home to its winter home, and it makes that round trip every year; that is approximately 22,000 miles a year, in its migration course. There is one little thing that happens from that, that the Arctic tern sees more sunlight, more daylight, than any other animal in the world. Because when it goes up to the north for its summer home the sun is already there and it has continuous sunlight throughout the four months that it is there; then it goes south for the winter and by the time it gets to the Antarctic the sun is also there and it has continuous daylight for the four months it is there, so that it has daylight for eight months in the year and part daylight for the other four months.

Now, in conclusion, I just have a few slides that I happened to have on hand that I thought would be interesting. This shows a robin's nest built on the top of a previous year's Baltimore oriole's nest, using that as the foundation and building its nest on top. This is the nest of the mallard duck, and it shows the down, you all know the eiderdown; the mallard has the same habit of plucking the down from its breast and laying it over the eggs when it leaves the nest to keep them warm while it is gone. There's a handsome youngster; it is the great blue heron about six days old. I think this is one of the most artistic bird pictures I have seen, this herring gull just lighting down on the nest. And the last picture that I will show is the humming bird, and I want to particularly call your attention to a widespread misconception of the food of the hummingbird. You hear about it and read about it as visiting one blossom after another to get the nectar. As a fact, a hummingbird is not there for that purpose at all. The food of the humming-bird are spiders and it goes from one flower to another in order to eat the spiders that are down in the bottom of the blossoms.

MR. STOUT: As farmers, we are all interested more or less in birds, and we are advised to protect them, put up boxes for them to have a nest in. At the same time another class of people tell us to get our spray and get Paris green and arsenate of lead and nicotine and all these things and destroy all the insects. How are you going to protect the birds when you destroy their nourishment?

DR. COOKE: If you use the arsenate on the apple blossoms after the blossoms are falling but before the apple has turned, I don't think you hurt the birds.

MR. STOUT: But I have reference to destroying the insects.

DR. COOKE: Oh well, you kill all you can and there will still be plenty left for the birds.

The CHAIRMAN: Has any one any other questions to ask Prof. Cooke on this topic before we proceed? If there are no other questions, why it seems desirable while we are in this work, that we should take up at least a part of the afternoon program and Mr. Blyholder is here and I will ask him to come forward and occupy the Chair. We will certainly be pleased to have him do so.

MR. BLYHOLDER: Mr. Blyholder would certainly be pleased to have you remain right there.

DIRECTOR MARTIN: You can both sit there if you want to.

(Mr. Blyholder takes the Chair.)

The CHAIRMAN: I am certainly pleased to have the pleasure of presiding over such a bright and intelligent audience as this. We will take up the program as it is prepared for 2 P. M. The first subject we find is, "Some Orchard Insects and Their Control," by Mr. F. H. Fassett, of Meshoppen, Pa. I have the pleasure of presenting to you Mr. Fassett, ladies and gentlemen.

Mr. Fassett spoke as follows:

SOME ORCHARD INSECTS AND THEIR CONTROL

By F. H. FASSETT, *Meshoppen, Pa.*

It may seem rather dull and dry after listening to such an interesting talk on birds, to come down to the practical subject of the control of insects in the orchard. It has been my endeavor for the past 25 years to learn the best way and the best materials and the best time to control these insects in my orchard work. There are a number of different materials on the market that are being used, and to my mind many of the spray bulletins and spray calendars, without any criticism of these things, are misleading to the average orchardist or apple grower because of the fact that they give us so many remedies and so many different times of spraying that it would lead one to believe that we must spray continually in the orchard. We have found that for practical purposes of control of these insects, that we believe we can control the insect enemies of our trees and of our fruit with three sprays. There is, to my mind, a right time to spray and a wrong time. If we can do our spraying just at the right time, then we believe we can control so many more insects than when we do it at some other time. For instance, the spray for the scale—if we can do that spraying just at the proper time, then we not only control the scale, but we control so many other insects along with it. It has been customary to spray for scale at any time in the winter when the tree was dormant. We realize that at this time many people have more time to do the spraying than at some other time, but we have learned this, that if we can put that spraying off until the buds of our trees are bursting open, then there is not only the scale to control, but there are a number of other very injurious insects that we also control with this scale, making it an application not only for the scale but for a great number of other insects.

We have come to a time if we expect to get the best prices for our fruits we must control the insects in our orchards. In order to better understand how to control them, it becomes necessary for us to know something of their life history, that we may attack them at the weakest point. The study of insects offers a very interesting field for the orchardist; we can watch them as they go through the different changes in their life cycle. Right in our orchards we have two classes of insects to deal with; one class known as a sucking insect, which pierces whatever they are on and extract their food from it, consequently we cannot poison their food and must kill them with something that comes in contact with their bodies; hence these remedies are called "Contact Insecticides." There are several materials that are used for this purpose. The ones commonly used are soluble oil, lime-sulphur solution, and tobacco preparations.

The other class of insects are the chewing insects, or insects that take their food by biting. The potato beetle is a common type of this class of insects. For their control arsenic in some form is used. We believe for practical control of the insects in the orchard affecting the tree and fruit, three sprayings are all that is necessary. The first spray is for the insects affecting the tree. There is no doubt that the soluble oil on the market has the greatest killing power of any of the contact insecticides. But in the use of the oil, there is an element of danger. If we always realize this and use it rightly we believe it can be used safely and with profit. It should be used on a bright sunshiny day so that it may evaporate off the trees as soon as possible. A very fine nozzle should be used and never hold the nozzle on any part until it forms in drops and runs down the trees. This is where the danger lies. Lime and sulphur solution is a much safer remedy; you may drench the trees with it and not injure them. The formula for the home-boiled solution is, 2 pounds of sulphur, 1 pound of lime, 1 gallon of water. Boil for about forty-five minutes or until the sulphur has all gone into the solution. Many growers are using the commercial lime and sulphur. As a rule it is more dense. Usually it is worth about three cents more per gallon than home boiled. In our work we use the commercial lime and sulphur as a contact insecticide. For an arsenic, we use the arsenate of lead in paste form. We believe it goes into solution better and sticks on the foliage longer than any other form.

The first spray should be made just after the buds have burst open. The materials used should be lime sulphur solution at scale strength and two pounds of arsenate of lead to each fifty gallons of material. We realize that it would be impossible in large commercial orchards to spray each tree just at the right time. But we believe that it ought to be as near to that time as possible. Because we can control the scale just as well then and we believe better, and we can also control a number of other insects as well. The green aphids or plant lice hatch from an egg laid near the bud and commence to feed on the tender tissues of the bud. They belong to the sucking insects and can be controlled at this time. The blister mite winters over in the scales of the bud and as soon as these conditions exist, they come forth and commence to feed on the tender leaves. These are also controlled. The cigar case borer which winters over in the larva stage, covered with a tough brown covering in the shape of a cigar from which it takes its name, as soon as there is food for it, comes forth and can be controlled also. The bud worm winters over in the larva stage; as soon as these conditions arise it commences feeding upon the opening buds and leaves. It is also controlled by this late spray. There are also a number of other insects that are controlled by a spray at this time.

The lime sulphur also possesses a fungicidal value and we also spray for such fungi diseases as apple scab, sooty fungus and other fungus diseases, spores from these disease will soon be loosened by the thousand. With the tree well covered with this material, the conditions are such that they cannot take root and grow, hence you see how important it is that this application should be made at the right time or as near as possible. The spraying must be done very thoroughly if we expect to succeed in controlling the insects. The second spraying should be done just after the blossoms drop, and before the lobes close up; this usually occurs eight to ten days after the blossoms fall. This spray is for the enemies of the fruit. The materials are diluted lime sulphur solution. One gallon of concentrate to 25 gallons of water and 2 pounds of arsenate of lead to each 50 gallons. It has been found that nearly all the larva of the codling moth enter the apple at the calix end, hence it is necessary that we force our spray in the calix cup as well as to cover the foliage with spray. The egg for the first brood of the codling moth are laid on the leaves or some smooth surface near the cluster of apples. They hatch and probably feed for a short time on the foliage, then enter the calix end of the apple. It is necessary then that we cover the foliage as well as fill the calix cups with spray material. The operator should be on a tower or platform from six to nine feet high so that he can look directly in the calix end of the apple and be in a position to force the spray into the calix cups. This spray is not alone for the codling moth but there are numbers of others that we can control. The apple curculio, whose feeding punctures causes our apples to be knotty, also feeds on the foliage and we can control it. This insect is always worse in sod mulch orchards or where the orchard joins the woods, because these conditions offer ideal hiding places for them to breed. Clean tillage will destroy many of these insects and all leaf eating insects such as tent caterpillar, green apple worms, and canker worms will be controlled.

We still have a weak contact insecticide, which will kill all young scale. It contains fungicide for the further control of scab, sooty fungus, bitter rot, and frogeye fungi. This is an important spray and should be very thorough. The third spray should be made about thirty days after the second. In an orchard where spraying has been done for years and a good system of orchard management has been maintained this spray may be omitted, but when necessary the same materials should be used as in second spray. If you have it at your command a little more pressure should be used. The eggs for the second brood of codling moth larva are laid where two apples touch or where an apple lays against a limb; hence it becomes necessary to force the materials up between the apples, and between the apple and limb so that the first feed of the little larva may be poisoned. If he gets one feed without poison he is beyond our reach and we are bound to have wormy apples. With these two materials properly applied at the right time and in the right way we can control the insects that infest our trees and fruit.

A Member: In using that lime and sulphur, is there any danger of its injuring the foliage of buds?

MR. FASSETT: We use the lime and sulphur solution—I might have said that we use what is known as a commercial lime and sulphur solution which is denser, or in other words, contains more sulphur than does most of the home-boiled solutions. The home-boiled solution usually registers about one twenty-four, while our commercial concentrates usually go up to about one thirty to one thirty-four, and if we use the home boiled, we use about one twenty-four—one gallon of the home boiled to twenty-four of the water; the commercial, one to thirty or thirty-five.

A Member: In using that lime and sulphur, is there any danger of its injuring the foliage of buds?

MR. FASSETT: Yes, when we are spraying as the buds open there is some danger of burning the first leaves that come out, but there's enough to follow, it doesn't matter, we may burn the first two leaves on that bud and yet we do no harm because there is plenty of foliage that will push on out and we can accomplish so much with delaying that spraying that we believe it is important that it should be done just at that time, and while I realize that in the large commercial orchards it is not possible to spray every tree just at that time, yet we believe that every man who has a commercial orchard or a small orchard either, ought to so arrange his work that he can spray just as near as possible to that time.

A Member: One to thirty is entirely safe, is it?

MR. FASSETT: We have found it perfectly safe on our apple trees.

A Member: I know of an orchard adjoining mine, and my neighbor does not spray at all and I have quite a bit of trouble with scales developing there, and I wanted to know how strong a midsummer spray I could use to control that trouble.

MR. FASSETT: With the commercial sprays registering about one to thirty two, I think one thirty is perfectly safe.

A Member: That would give you a density of one one?

MR. FASSETT: Yes, one one.

A Member: What time would you spray for the railroad worm?

MR. FASSETT: It depends on when the apples ripen. The apples ripen with us in September and the spraying should be done early in September or the last of August. The railroad worm usually affects the apples just before ripening.

A Member: There are only a few trees of the summer apples on which I have ever been troubled with the railroad worm.

MR. FASSETT: Well, if you could spray say 60 days before the date of ripening of that apple with this sweet material, it would go a good ways towards correcting it.

A Member: Have you ever tried spraying earlier to control the moth in her feeding? I mean the adult of the railroad maggot?

MR. FASSETT: Yes, with this sweetened spray that we were speaking of.

A Member: I mean doesn't she feed a little earlier?

MR. FASSETT: They do not, usually. I think the first appearance of the month is usually in July or August; it don't appear early in the season; at least that is the life history we have of it.

A Member: I think that it does appear earlier than that, it certainly did in Rhode Island, I think along about June. Those eggs seemed to stay dormant for some time in the skin of the apple and don't hatch or at least the larva don't develop until the apple begins to ripen and soften, but many of the eggs are laid early in July and June in that climate.

MR. FASSETT: It seems to me a little earlier than we have learned to think they are here. In our own work, we never had any trouble particularly with that railroad worm or apple maggot. It might be that they would appear a little earlier than July here, but that is about the time we have learned to think that they are here.

A Member: Is it generally practical to locate the borer twice in the season—in the fall and spring?

MR. FASSETT: Yes sir.

A Member: I would like to ask you a question in reference to the June bug. I had four or five persimmon trees, and last year I have lost all the blossoms and all the foliage in a couple of nights; the June bug ate everything off and the result has been that I don't get any persimmons; and also I had a couple of propagated or grafted chestnut trees and the June bug took the foliage entirely off. How will I get rid of them?

MR. FASSETT: Why, they take their food by chewing and a spray of arsenate no doubt would control them, if you could get it on at the right time.

A Member: The damage was done so quick that I hardly know when to do it.

MR. FASSETT: The Chairman suggests that you go out and hold a lantern and let them run against it.

A Member: Does arsenate of lead lose its strength when it is kept from one year to the next?

MR. FASSETT: If it is kept covered with water, it will not, but if you should keep it in a vessel where the water leaks out, it is liable to lose some of its strength.

A Member: About the fourth or fifth of June, I discovered on a sour cherry tree, under the leaves, hundreds of little black insects that just came in there, it seemed to me; what are they?

MR. FASSETT: They are the aphids. There is a large family of those aphids, I do not remember just how many but a great many and that is one form of them that was on the cherry tree.

A Member: Do you spray for them?

MR. FASSETT: Yes sir.

The CHAIRMAN: The program is not completed yet gentlemen. The next subject is "Profitable Apple Culture," by Mr. Sheldon W. Funk, of Boyertown, Pa. I have the pleasure of presenting Mr. Funk.

Mr. Funk's address is as follows:

PROFITABLE APPLE CULTURE

By SHELDON W. FUNK, *Boyertown, Pa.*

Mr. Chairman and Friends: I realize very well the uncomfortableness of this room, and I assure you that I am not going to keep you one minute longer than is absolutely necessary. We are going to hurry through this as quickly as we can. If there is anything which comes along that you don't understand, or that I fail to explain, don't hesitate to ask me and I think we will be able to get through in very good time.

Owing to the fact that this last season apples have been selling very low, a great many men have come to the conclusion that there is no more money in the apple business. I have met a great many fellows who are getting very sick and claim that the apple business is going to be overdone; that we have overplanted the apple. Possibly we have. But we must remember that the low price this last season was not due alone to the fact that we had a rather large crop; but it was due more to financial conditions, because, when we look at statistics, we find that the crop was not overly large. Our crop this last season was about 41,000,000 barrels. In 1912 we had 47,000,000 barrels and in 1896 we have 69,000,000 barrels, so you can readily see that we did not have an exceptionally large apple crop, and still the prices were very low. But if you have overplanted, that does not mean that we are not going to make any money out of it. There is money in every business; it depends upon the management whether or not you are going to get it out. Nobody is going to grow apples at a loss; if you cannot grow apples at a profit, you are going to get out of the business. But the fellow who does stick, who does pay attention to all the things that go to make good apple growing, is going to make money out of apples.

There are two things that I think are very important in the growing of apples. First of all, I believe we have got to grow apples of the very finest quality; and, secondly, I believe we have got to be in a position to store those up and hold them until the market is right or as near right as we can get it. Any of you men who have watched the apple market during the last number of years have noticed that almost every year apples have gone up a little bit late in the season, and the man in a position to store his apples and hold them till that time usually made some money out of them.

Let's have the pictures. I am not going to take up that side of it, but just bring out a few slides about the culture of the apples and we will skip along rapidly. The first slide shows the first operation in the digging of nursery stock. You have four mules fastened to a long knife like arrangement that goes underneath the ground and cuts off the roots of the tree. This shows the tying of the trees into bunches. Two straps go over the tops and are drawn tightly together. This shows several troubles of nursery stock. The upper one is the wooly aphis which Mr. Fassett explained to you. Down here we have crown gall and down here we have two demonstrations of hairy root. Whenever you find either of these conditions on your trees, I would burn them or destroy them. Mr. Fassett explained the wooly aphis to you. Here we have a slide showing a cover crop of hairy vetch and rye. You will notice two small boys in here and it will give you some idea of the height of the cover crop. In my estimation, it is the coming cover crop for the State of Pennsylvania. I don't believe that anything will give as good results as hairy vetch and rye.

A Member: You stated when you were down at our place that a good thing for us to plant as a cover crop was buckwheat; if we sow that buckwheat early, won't it be self-seeding and won't we have trouble with mice?

MR. FUNK: I made the statement in this way. That on your Lancaster county soils, where you have limestone and are trying to grow peaches on the limestone, you usually have a good bit of trouble in the ripening up; your wood—the trees grows a little too long in the season, makes too much wood growth.

A Member: But this is in the apple orchards that we are speaking of.

MR. FUNK: I recommended the buckwheat on the peaches more than anything else to help ripen the fruit; at the same time you could harvest the buckwheat and secure a partial crop, but when it comes to the apple orchard I would rather have the hairy vetch and rye and I recommended sowing another cover crop like crimson clover which you can use with the buckwheat and when the buckwheat was harvested, the other would come on.

Here we have a slide showing the starting of the apple orchard with the sod mulch system. The orchard is sown with rye; the rye, about the time it comes to head, is cut and placed around the tree as mulch. It is one of the best ways I have ever found of getting a large amount of mulch. To begin the sod mulch plan in the young apple orchard, here we have the spring tooth harrow, with steel frame in it, which is used in cultivating low headed apple or peach trees. This frame can be removed. One section of the tooth goes underneath the trees and elevates the soil underneath, and then after we have cultivated the entire orchard in that way, we take out the frame, put the harrow together and cultivate the remaining portion.

This frame should be of the same width as the spring tooth when the two sections are together. Here we have a one year old apple tree, that is planted one year before pruning. Here we have the tree after it has been pruned. You will notice that we only have left three branches; I don't like to have more than three or four. You will notice also that the head is well separated. These are rather close together, but that does not make any difference because we have the other part in the top and that head will never break. If the three came out at one place, there would be danger of its breaking. We have cut them back. I like to keep them even over the top, because it makes a nicer, rounder tree.

Here we have a three year old tree before pruning. This was the first year's growth cut to the second year, cut to here. I believe in cutting up trees to one year, that is cutting to the outside buds, you notice as they were cut here. The next slide shows the tree after it has been pruned. We have thinned out these branches, getting our leaders, but we are not cutting back this year. We cut back for two reasons: First, to stouten this part there; secondly, to spread the head. Now we are going to let this tree branch because it will branch right here at all the terminals, and then the following year, if it needs cutting back instead of cutting to an outside bud, we will be cutting an outside branch; that will spread the tree faster and give fruit sooner. Here we have a slide taken in Clarion county showing the tree before pruning. We had to cut the tree out very hard to establish our leaders; that meant that there were no small limbs in here and it leaves the tree very bare. I simply give these two slides to show what you would do with a tree of that age that had never been pruned.

Here we have a five year old winesap in full bloom. It has been pruned, as is shown in the other pictures. It spreads nicely, is not thick in the center and is not very high. The next slide shows the tree with the apples on it and gives you an idea of what the stamen winesap will do at that age. Here we have a seven year old smokehouse, a very beautiful tree, one of the most beautiful I have ever seen in the State. That is in full bloom. Here we have a seven year old stamen winesap. Some of these pictures were taken in my own orchard; the others were not. There is a tree that picked about four bushels of apples, seven years of age, and all the apples were first-class and perfect.

This slide shows us the way not to prune an apple tree. You will notice that this picture was taken just after the man had finished; you can see the branches, the limbs, lying down here in the snow. He left several stubs here to hang up his coat or hat in the fall when he went out to pick apples, and that is a thing we don't want to leave. This is the thing that has given us all of our rotton trunks. You often find apple trees with rotten trunks and it was due to the fact that at some time the man who went out here to prune left a stub of that kind. If a limb is cut close to the collar, it will always heal, but if you cut it that way, it will never heal. The rot fungi start in here and work back through the line and down into the trunk and the result is that the tree is permanently injured. Here we have a tree pruned differently. It shows a 20 year old start. This picture was taken just before pruning and not after and the result is we have quite a number of small branches that should come out. I have given you the slide to show the build of the tree. This is another tree in the summertime; it is just as easy to grow trees of that kind as the one I showed you several slides back. The only difference is in the treatment. We find in the State of Pennsylvania a great many old apple trees that have been almost killed by scale; all of the upper branches have been cut off and now the question is how are we going to renew those trees? We don't want to cut them down, because the trunk is still good, and if we can renew it in about three years we will be having apples.

Here we have a tree just before renewing it. You will notice on this tree that the water sprouts have started; if those water sprouts had not started we would not dare cut it back the way I am going to cut it back here; it would be necessary to leave in some of the branches. The next slide shows the tree after it has been cut back, and we can make a new tree. If we had not had the water sprouts, it would be necessary to leave in some branches for shade and to prevent sunscald. Unfortunately we have trouble with some of our nurserymen and oftentimes it is necessary to graft and bud over limbs.

We want to know a little bit about budding or grafting. Here we have some of the tools used in budding and some cuttings showing the apple and currant cuttings that are made to be placed in the spring. Here we have the operation of budding. You can bud almost any kind of a tree and we must bud the peach tree. Grafting does not work well on the peach tree and does not work well on the cherry. I prefer to bud cherries and apricots also, but the other trees we can graft. This is the first operation we make, splitting the bark. You make an up and down cut and then a cut across the top and if it is made about the end of July, the beginning of August when budding should be done you will find that that bark will spring loose. Then we cut the bud in this form. The bud looks like that after it has been cut. That bud is taken and slit down in between underneath the bark and then tied with something like raffia, or if you don't have raffia, take cloth of any kind and tie it tightly, leaving the bud exposed, and in about three weeks the bud will have grown fast and next year you cut off the tree above the bud and the bud will start to grow. There we have root grafting, the same operation as what is known as whip grafting. You notice this is your scion. Make the cutting that way and slip it. This is the stock and that scion is slipped into the stock in this way, tied and a little bit of wax placed around the graft and it will grow very easily. The bud need not be waxed. This must be waxed. Here we have several other grafts. This is the cleft graft, the graft we must always use in larger limbs, and you will notice, most of you are acquainted with this graft, you split the limb.

There is one thing I want to call your attention to, I would always have a bud at the shoulder right there and always be careful to cross the cambium just a little bit. You will notice that these scions are not put in straight up and down, they are crossing just a little bit. If you will remember that, you will never have the least bit of trouble in getting grafts to grow. Over here we have what is known as the bridge graft. Sometimes we have trees girdled and don't want to lose them and can oftentimes save them by putting in a bridge graft. This is the way you make your graft. Both ends are cut a little and then you split the bark here, insert one end her and another there. It is well to place a small tack in each end and wax it as you see in this illustration here. That is a rather hard operation, but oftentimes we can get them to grow very easily and save the trees in that way.

Here we have a young tree that has been top grafted, a six year old tree, that turned out to be a wild tree, so we put on another variety and you will notice we have grafted four limbs and then left these side limbs for shade. In two or three years all those side limbs will come off and we will have the new top coming on there. Here we have an old tree that has been top grafted. It shows one year's growth. This picture was taken this spring just after the leaves had come out. The ends of the limbs have been grafted and on the side of the tree we have some water sprouts growing up that we have left there to grow for shade. Eventually all those water sprouts will come out and we will have a new tree. This shows a twenty-year-old gano at home, and there is one thing I want to call your attention to and that is that it was necessary to prop this tree, due to the fact that it had not been thinned properly. If the tree had been thinned properly, there would have been no occasion for the props. Here we have a stamen winesap of the same age. You will notice that that tree was thinned properly and no props are needed, with the result that the apples are a great deal better on a tree of that kind.

This is a slide showing the work of the apple leaf hopper. It is a serious trouble, but oftentimes you will notice it working on your young trees disfiguring the leaves in that way. I merely give you the slide so you will be able to recognize the trouble. It is not serious. You don't need to pay much attention to it. Here is one of the most serious apple or pear or peach diseases in the State of Pennsylvania, that is the fire blight; it is the worst disease we have in the southern part of the State, doing a great deal of damage. You will notice all these dead twigs here have been blighted. The only thing we can do is to cut it back, cut out the dead twigs. Always cut back into the new wood and then watch your fertilization. You will find that the trees fed too heavily with nitrogenous fertilizers will always blight more than a tree not fed so heavily. This is a slide showing the codling moth. Mr. Fassett explained that and I will not waste any time on it. Here we have a sprayer that does very good work in a hillside orchard. You will notice the wheels are very low and you can spray on a steep hill before there is any danger of the machine toppling over. This is the last slide and shows the finished product. That is the kind of apple that we grow when we do everything just right. When you have apples of that kind, you have no trouble in disposing of them and you have no trouble in finding a market and always at good prices. Let's have the lights, please.

Now we have a few minutes more and there are one or two things I would like to take up because I believe they are rather important, and we have gone over this cultural proposition here very rapidly; but there is one thing I want to bring up in particular, and that is, if you are going into the apple business and you are going to take care of those apples, let's do all of the operations right. I believe that is very important. During the last six or eight months, I have spent considerable time in looking up the cost of the production of apples, and I have written to quite a number of men, I have spoken to quite a number of other men, and I have figured out the following costs.

Now I know that you people are not going to agree with me, that is not all of you, because perhaps under your conditions it will cost more or it will cost less, but remember that these are average conditions for average varieties; and the point I want to draw out is that the cultural operations, the growing of the fruit, costs very little compared with the marketing of it. Now these figures are taken on 20-year-old trees. The average cost of producing a barrel of apples is about 29 cents; that is counting the labor, all of the labor and the material used in the orchard, such as fertilization, cultivation, cover crops, thinning, spraying and pruning. I am not counting the interest on the investment, insurance or anything like that, but simply the labor and the material that goes into the orchard to grow the crop. We are not counting picking or packing, and these are as near as I can come to the figures: The cultivation and the cover crop, about five cents per barrel; fertilizers, about five cents; spraying, four cents; pruning, six cents and thinning nine cents. Now those figures are all high compared with most men, but there you see we have 29 cents to grow the barrel of apples. Then we will follow it a little bit further, taking 15 cents for packing, 15 cents for the barrel, including freight and hauling, 45 cents; including freight, storage, etc., we have a total of $1.20. Now after we have got the barrel of apples ready for the consumer, it has cost us $1.20. And here is the point, in order to make it pay, I believe we should do all of those labor processes right. I know a great many men in the State of Pennsylvania that are good sprayers, they are good cultivators, they are pretty good pruners, but they fall down on fertilizers and fall down still harder on thinning.

A Member: When do you start to compute that cost?

MR. FUNK: That was about eight months ago.

A Member: I mean at what age of the tree.

MR. FUNK: This is a 20-year-old tree. Now a young tree will cost more than an older tree perhaps a little bit less, but this tree is 20 years old. I say more of us fall down on fertilizers and still more on thinning. I believe that more trees are dying to-day in the State of Pennsylvania because they are starved to death than because of anything else. We find it everywhere and I say I believe that we ought to fertilize a little better and we ought to thin a little better.

Now we will take the fertilization again. Paying five cents a barrel for fertilizer, you will be able to keep that tree growing in first class condition; you will be able to have it make as much wood growth as it should. I like to have on a tree of 20 years of age anywhere from 8 to 15 inches, and that is the best sign that I know of to tell us whether or not we are treating that tree rightly. For nine cents we are able to thin that tree, and we will take up th importance of thinning a little bit later. Last year I sold quite a number of apples right out of the orchard. Apples at that time were selling at 35 cents a bushel, that is apples that had been picked and sorted and put in the bushel boxes, not packed, understand, simply put in the boxes, 35 cents a bushel and I sold my apples the same way, no sorting, right off the tree, for 70 cents a bushel; in other words, apples were selling for $1.05 a barrel and I got $2.10 a barrel for my apples in the same condition. There was a profit of $1.05 made entirely on those twenty-nine cents because the picking and the packing and the sorting and everything else on good apples does not cost a cent more than on poor apples; in fact the picking and packing of poor apples costs more than the picking and packing of good apples. Now can't you see that? Most of us think it costs too much to thin, we cannot afford to put on enough fertilizer, we cannot afford to spray as thoroughly as we should, or we cannot afford to cultivate as often as we should, but you can see at once that the labor cost is very low and if, on the twenty-nine cents I was able to make $1.05. I think it was pretty good profit and I believe we ought to do every one of those operations just right, we ought to give that tree just as much fertilizer as it should have; we should spend just as much in pruning as necessary; we should spray it just as well as we possibly can; pay no attention to the cost—except that I try to do economical work—and then last of all I believe we should thin all of the fruit.

I am just going to waste a few minutes and take up the thinning proposition, because it is an operation that must be done now within two to four weeks, depending upon whether you are going to thin plums, peaches or apples. It is the one operationI have found in the State of Pennsylvania has been neglected more than any other operation. Most people have an idea that it is all right; but they are from Missouri and you have got to show them, and the only way they will find out is for you to go into their orchards and show them by pruning one or two trees. I don't believe you can ever get a man to thin his old orchard the first year. First of all, you want to begin at the right time and that is when the apples are about the size of a quarter of a dollar, as soon as you can handle them nicely. Peaches we thin just after the June drop. I don't want to pull off those apples with my fingers because I will take off a great many of the fruit stems and injure next year's crop, and if I have a cluster of four, I will injure the fourth so it will drop also. First, take a small shears and clip the stems; secondly, take the poor ones, then the small ones and then take the good ones until they stand six or eight inches apart and do that over the entire tree.

That is where you are going to have trouble. A fruit grower never gets it in his head that one apple four inches in diameter will weigh as much and make as much as eight apples two inches in diameter; I repeat that one apple four inches in diameter will weigh as much and make as much as eight apples two inches in diameter. Where you have a limb growing eight apples ordinarily, two inches in diameter, you might as well have a limb with one apple on it four inches in diameter; it is not only worth more, but it is not nearly as hard on the tree, because we all know it is the development of the seed and not the flesh that drains upon the vitality of the tree. The flesh of an apple does not drain the vitality of the tree; it is the seed and that is the reason why, when we leave all these apples upon the tree we have so many more seeds and get a crop every other year. That is very common in a great many sections. We have a heavy crop of apples this year, next year nothing, the third year a heavy crop again, and so on, simply because when we had so many apples, it drained so hard on the vitality of that tree that there wasn't sufficient energy left in it to develop the fruit buds next year and the tree had to lay off one year to develop the fruit buds. Thinning will not always give you a full crop every year; you must have the right varieties. But you take a Roman Beauty or a Stamen Winesap and thin it hard and unless you have cold weather, if you treat the tree right you will find that you will get a good crop every year. The Baldwin is one of the trees that won't do it, and still in Lebanon county I was shown something there that proves very well what thinning actually will do. I visited a man one day and he took me out into his orchard and there he had a great big Baldwin apple tree and he said, "There is an apple tree that last year was so loaded down with apples that I thought it would break to pieces. At the time I should have gone out to thin it, I was ill, I couldn't get out of the house, but one day my wife came out and thinned that tree as high as she could reach from the ground, went all around the tree on the ground and thinned off the apples as high as she could reach, and when I went down that summer the limbs were so loaded down that they had to be propped up all around the tree, and from there to the top of the tree there was scarcely an apple on the entire tree—from as high as you could reach from the ground."

I don't want you to go home and try to thin the whole orchard, but thin a few trees and thin them until you think you have taken them all off. Better not do it yourself; better hire some other fellow, because you will never thin them hard enough. I never do any thinning at home because I can't. I like to get a good bunch of boys together, boys of 15 or 16 years of age, active and not afraid to get up on a ladder, take those fellows out in the orchard and show them just how I want it done and I stay there just long enough until I see they are doing it right, and then get out. If we stay around we will always have too many apples on the tree, but if I am gone they will do it right. Those fellows don't care; if I tell them to take off all the apples, they will take them off, it don't make any difference to them, but it would to me and I can't thin an orchard as well as some fellow who is paid to do it. I thank you very kindly for your attention.

Recess until 2 P. M.

THURSDAY AFTERNOON

The CHAIRMAN: Ladies and gentlemen, the time for the opening of our session has arrived. We will start the program where we left off in the forenoon, and I take pleasure in introducing Mr. Daniel Dean, President of the New York Potato Growers' Association, Nichols, New York, who will talk to you on Potato Growing and Seed Selection.

MR. DEAN: Ladies and Gentlemen: This is my second experience in talking to a Pennsylvania audience and I have been my whole life a farmer. My first work on the farm that I ever did was when I was a school boy, covering potatoes with a hoe, and from that time on I have been raising potatoes all the time. Now, the potato crop is one of our most important ones and has many different peculiarities. It comes to us from quite a different climate from what we have here in Pennsylvania. It comes from a climate which is cool, in the mountains of Peru, moist, and the sun is not severe. It developed, under those conditions, a different form of leaf, a different form of root, from what would be the right thing to cope with our conditions, and consequently, we have to study the plant and its habits, in order to adapt it to our conditions and to adapt our conditions to the potato plant. It has been found that heat above a certain degree is very injurious to the potato, and when that degree of heat is raised, the vitality of the potato and its vitality as seed for the coming year is badly injured. The leaves of the plant do not stop transferring moisture, as many of our plants do, when the heat becomes excessive and the plant has practically exhausted the soil moisture, but keeps on transferring, and we get the condition called sun gall, and great injury often results. The potato plant is able to stand a degree of acidity which most of our other farm crops can not. In Europe we have conditions more similar to those of South America than here. The season is longer and the climate is cooler.

Mr. Dean then presented the following paper:

HILL SELECTION OF SEED POTATOES

By DANIEL DEAN, *President New York Potato Growers' Association, Nichols, N. Y.*

Seed selection is now attracting more attention than anything else about potato growing. Its value has been proven by very accurate experiments extending over several years at a number of experiment stations. Many farmers have found seed selection to be one of the most profitable parts of their work. I was one of the first in the United States to use it, beginning in the fall of 1904 by digging about 300 bushels with hooks and saving the best hills. The following year this selected seed gave an increased yield and greater market value. I have found the profit from seed selection to be even more from the increased sale value than from the better yield. The cost is very small, consequently the net profit above cost is large in proportion.

We are always on the lookout for some new variety which should displace those we have now as these in their time drove out the Burbank and Early Rose, themselves successors to now forgotten varieties. Many thousands of new seedlings have been, and are constantly being tried out. From these a list of less than a dozen varieties can be made out which are superior to all the rest. The chance against getting a new seedling variety better than those we now have is in the same proportion of thousands to one.

We have always thought of a potato variety as something unchangeable, though with also the belief that sooner or later it must "run out." Seed selection has now proved that varieties are made up of many separate strains, differing more or less, with further variation going on most of the time. From these variations within a variety we can select and keep up a strain having the particular qualities most suited to the needs of any grower, in the same way that we now select the variety most suited to our conditions. It is now believed that unless a variety is grown under unfavorable climatic or other conditions that it will keep its vigor indefinitely. One variety has been grown in Sweden over one hundred and fifty years.

Conditions in the United States are often poor. In their original home in South America the growing season was long, wet and cool.

The tubers were small, and but little drain on the strength of the plant. Out of the many thousands of varieties produced we have kept for our use only those that produce very heavy crops of tubers in one half or one third of the time required by the original potato plant. In connection with our hot and dry climate this throws a very severe strain on the vitality of the potato. It is not strange that some plants break down and produce tubers nearly worthless for seed. In northern Europe the great ocean current, called the Gulf Stream, makes the climate much more favorable to the potato than here. Yet differences in vigor are seen even there as tests between seed from the north and south of Great Britain show. In our South the summer heat is so great that potatoes maturing at that time are nearly worthless for seed. When planted in the same section so as to mature in the cool weather of fall, good seed results; the so-called "second-crop" seed. Even as far north as Ottawa, Canada, dry and hot weather in 1906-7-8 ruined the varieties grown there. *I believe that growers should study every possible means of maintaining vitality of potatoes in hot and dry seasons.* Not only is the crop reduced at a time when prices are highest, but the seed is injured for the following years.

We find that our varieties are constantly developing new strains in each, some valuable and some degenerate. We can prevent injury and store up vitality by growing them under as favorable conditions as possible. Then by the use of different methods of seed selection we can find and use as seed each year the best yielding and selling strain of the variety most suited to our climate, soil and markets.

Many experiments show that when the tubers of any hill are used as seed each has a strong tendency to resemble the parent hill in all its qualities. Every potato grower is consciously or unconsciously changing his varieties, either for better or worse. A number of methods of choosing seed potatoes are in use. Having never seen any comparison of the merits and defects of more than two or three together I will try to present a fair discussion of the whole subject.

THE USE OF SMALL SEED

By carefully digging a field of potatoes it will be seen that a few of the poorest hills produce a larger proportion of the small tubers. The best hills produce mainly large ones. Diseased hills are almost certain to have a light yield and the tubers mainly small. I have selected hills for seed for 11 years, always choosing the best yielding. Now I get less than 2% or small in good seasons, even though the hills are planted only a foot apart to produce the medium sized stock demanded by city markets. I do not feel that the reduction of the small tubers till there not enough to plant the next year's crop is a serious objection. Farmers use small seed because it is cheap. While it is possible that the increased yield from the use of large seed might not pay the extra cost, the use of small seed year after year increases the proportion of weak and diseased hill, the yield diminishes, and the variety is said to be "run out." Many scientific experiments have almost always shown better yields from large than small seed when sorted in the usual way. The Geneva Station has made a test in which care was taken to have the large and small tubers taken from the same hills in order that the inherited vigor might be equal. Under these conditions the small seed was at least as good as large pieces of equal weight. While an exceptionally all the best hills in a field of tubers longer than the usual variety of bad season might produce many weakened hills with small tubers small seed may be considered safe if taken from a stock from which the weak hills are kept eliminated by some method of seed selection.

THE USE OF LARGE SEED

This produces a better crop and better seed at an increased cost. Often farmers buy new varieties which produce well at first because the seedsmen have grown them using large seed and have had good winter storage conditions. The yield often falls down as soon as handled under the usual farm conditions.

SELECTING SEED ACCORDING TO AN IDEAL TYPE FOR EACH VARIETY

This plan would be of immense value if we were certain just what points in the appearance of a tuber were reliable indications of its value as seed. The Uncle Sam variety varies all the way from smooth flat-oval shape to a longer and rougher type, the vine, flower, etc. being the same. I once selected the hills which were smooth, discarding those longer and rougher. The yield compared to other varieties declined so rapidly that it was apparent that the poor looking hills were the ones that had given the yield. With the Rural this same smooth type is found in the best hills and is the best seed. Tubers longer and narrower than the usual type of any variety are to be regarded with suspicion in most years, especially if the eyes are longer than usual and clustered closely around the seed end. Prof. C. L. Fitch, in Iowa Extension Bulletin, No. 20, states, that "Flatness and relative shortness are the result of healthy growth and signs of strength." One exception I have noticed is that in seasons like 1909 and 1912 when a long drouth was followed by plenty of rain after the tubers had reached their usual shape, I have seen all the best hills in a field of tubers longer than the usual variety of type. Where seed selection was not practiced by neighbors the enlargement took the shape of knots or prongs. The poorer hills died earlier and their tubers were of the usual variety type. When these best hills were used as seed the following seasons the shape went back to normal. Prof. Wm. Stuart, of the National Department of Agriculture, states, that shape is often affected by the nature of the soil and culture methods as well as the season. So for the present we are not warranted in depending too much on any rigid type as a means of selecting the best seed potatoes. Any one making a tuber-unit test will be greatly surprised at the variation between different units although the seed tubers may have been as near exactly alike as it was possible to select from the bin.

MARKING AND SAVING HILLS WITH LARGE TOPS

The large tops are often believed to indicate large yield. While this is often advocated and appears at first thought very probable, I have never been able to find any scientific experiment in which seed from hills with large tops was compared with that from hills judged on the basis of yield and appearance of tubers. My own experience in 11 years of seed selection with a total of over 50 varieties is that hills with large tops are seldom the best yielders. Selection on the basis of yield has practically eliminated the extra large tops. Prof. W. A. Orton, one of our best potato disease experts believes that large and late growing tops may be an indication that the plants have been injured by the heat. I have found them in blue-sprout, white-sprout and Irish Cobbler varieties. Usually each hill has a small number of very large potatoes which are coarse, deep-eyed and often hollow. As these are almost unsalable in large cities, this is another objection to saving hills with large tops.

BLIGHT RESISTANCE

A few years ago there was demand for blight resistant potatoes. Sometimes these late growing hills were saved on that account. One of the best potato bulletins we have, Ohio No. 218, by Prof. F. H. Ballou, states, that "Experiments coupled with many observations suggest that little is gained by selecting parent hills on the basis of disease resistance of the plants over selecting parent hills because of superior individual yields. It is the actual work done within the hill that should most interest the potato breeder. The later growing hills simply demonstrate that there develops, through natural plant variation these tardy, deliberate, slow-maturing strains which we should not mistake for strains of special disease resistance. At the Vermont Station hundreds of varieties have been tested for blight resistance. Few showed much, and these were commercially useless from other defects in yield, shape, etc.

SELECTION ON THE BASIS OF A PARTICULAR NUMBER OF SALABLE TUBERS TO THE HILL

Practical growers know how the number set in each hill varies with each season. In 1914 the set in my field was small, and the tubers large. In 1905 there were too many in the hill and the crop ran small. In 1910 one field had a small set and another planted with the same seed the same day but with a light sandy soil set nearly twice as many to the hill.

EARLY REMOVAL OF WEAK AND DISEASED HILLS

Most potato diseases reduce the yield of the affected hills. Removing hills with fusarium wilt, black-leg, leaf-roll, curly-dwarf, etc. leaves a healthy seed stock which will give a better yield the next year than if the diseased hills are left. Particularly is this true where small seed is planted, as diseased hills produce many small tubers. Some of these diseases also infect the soil and attack potatoes for years after. This digging must be done before the healthy tops die. Work is usually not pressing at this time. The extra expense is small as these hills would have to be dug and picked up later anyway.

THE TUBER-UNIT METHOD

Good sized tubers are taken from the bin of as near the same size as possible. These are quartered lengthwise and planted in adjoining hills. When dug all are piled together. This method has an advantage over any other in that one can begin in the spring and have clear proof of seed transmission of plant characters the same season.

This method of quartering all seed is objectionable after the first year because of different strains varying greatly in size. The quarters from the strains which have only a few large tubers to the hill will give a better start to their plants than those from the strains with a larger number of medium sized tubers to the hill. As these large potatoes are worth less per bushel, this method increases the proportion of poorer yielding and less valuable potatoes. There is also considerable labor and trouble in keeping units separate. Other objections are that some growers are liable to pay more attention to getting a particular tuber type and to large vines than to yield and sale value.

DIGGING BY HAND AND SAVING THE BEST HILLS

This is especially adapted to the immense proportion of our crop dug by hand. Where machine diggers are used the seed should be dug before the crop is ripe enough to dig without bruising by the machine, unless late blight is known to be in the field. In that case the seed may be dug later on days when the ground is too sticky from rain to use the machine. It is certain in Europe and probable in this country that immature seed yields better than that allowed to become fully ripe. The only extra expense over ordinary hand digging is a little care in keeping hills separate and that of going over the rows and picking up the best hills first. While some may be better because of a better chance on fertile spots it is very unlikely that any seed will have the same luck two years in succession. So the second year will throw out all except those that yield well because of their inherited vigor. Farmers can be persuaded to use this method because it involves less change from their present methods than any other. As the number of hills worked with is limited only by the size of the field the chance of finding the very best strains is increased.

HILL-UNIT OR HILL-ROW SYSTEM

Planting a short piece of row from the produce of each hill or larger unit is the most accurate method for scientific work and for farmers who have the time for caring for several hundred strains. Field methods of cutting seed must be used as the results are more reliable for farmers' use than where the tuber-unit method of quartering is used. With any strain the pieces must be of equal average weight or the tests are worthless. From each strain a similar amount, say one bushel to the short row should be saved for comparison. The whole of the produce of the best strains should be saved to produce seed for the main field crop.

PRACTICAL POINTS

Before beginning seed selection a grower should first make sure that he has the type and variety most suited to his climate, soil and markets. Eastern city markets pay the highest prices for flat, round to oblong white potatoes of medium size and good cooking quality, smooth, without disease and free from second growth shown by knots and cracks. Red varieties may be sold in summer. While others may do well in some seasons the Rural type of blue-sprout varieties do best from New England to Minnesota, including most of

New York and Pennsylvania. The Green Mountain or white-sprout type is best in the cooler climate of Maine and northern New York, and does well further south in cool and wet seasons. Burbank is raised on the Pacific coast and the Pearl, under irrigation, in Colorado. Irish Cobbler, Bliss Triumph, Green Mountain and other varieties are raised in the north to be sold in the south for seed.

It is necessary to test new varieties at least two years because of variation between seasons and because they may have been kept under different storage conditions. The seed selection can be begun with all the first year and all but the best variety discarded.

Any score-card of points may be used in the selection of a type, variety of strain according to the wishes of the grower. With most of us net profit is the thing to be most considered. This may be produced in different ways. For early markets, extreme earliness pays better than high yield on account of high prices. Quality and white color are also less important than with the late main crop varieties. Freedom from disease must always be considered unless like scab it can be prevented by disinfection. High yield, good appearance and table quality are almost always the largest factors in securing the greatest net profit.

Beginners should use spring scales until their eyes are trained to judge the weight of hills with fair accuracy. At first a hill with a few large tubers will appear to the eye to be heavier than one with a larger number of the medium sized tubers that sell better. Large size is a bad defect for city trade. There is some danger in trying to work against the usual type of a variety as I found in trying to select a smooth type of the Uncle Sam at the cost of reducing yield. Shape may be affected by the season, character of soil and culture methods. Small tubers may be expected in any hill. Some varieties like the Irish Cobbler normally have a numerous second setting, at least with me. Weight of salable tubers should determine judging, disregarding small ones unless many more than usual. Any mixture of varieties should be thrown out. One is the best for any one set of conditions and only that one should be kept.

I never saved any poor hills to test till 1912. That year the low yielders row averaged only 70 bu. per acre against 350 for the adjoining rows treated exactly the same. In 1913 the low yielders averaged 150 against 290 for the normal. This was not a fair test as the low yielders were mature when a frost, September 14, killed the others while in full growth. In 1915 the yields were 74 and 334 bu. per acre. In some seasons low yielding strains may be told by a longer and more pointed shape than normal.

I dig about one acre out of 17 each fall with hooks, either before the rest are ripe enough to dig with a digger or on days too wet to use a machine. Each hill is kept separate. Next I go over the row myself and select 5 to 20% of the best hills. This is the hardest part and requires the best judgment. These selected hills are planted the next year in a seed plot on the best part of the field, if necessary extra care should be given. The soil should be one holding water well for times of drought, the time when seed vitality may be injured. Early in the fall and before the tops on the healthy vines die. a hook should be used to remove all weak. early, dying or diseased hills. This year I found only 4 bushels of such on 5 acres yielding 1,810 bushels. Small tubers from such a plot are as good as large but there are not very many.

Owing to the different parts of a field varying greatly in yield it is better to take a percentage of the best hills rather than to use a rigid standard of weight over the whole field. This percentage should be higher in the good parts than where potatoes are poorer because of possible injury to the vigor of seed from poor parts of the field. In case conditions are so poor that degeneration takes place it would be best to save only from the best part. Seed selection cannot prevent loss of vigor, but it can quickly eliminate the damaged strains unless the injury is so severe that all are affected.

Scientists are not agreed as to whether the yield of a particular strain can be increased by annually selecting the best hills. It is regarded as certain that the average yield of a variety can be increasd by finding and multiplying the best strains within the variety. As a farmer I am well satisfied that this can be done with profit by using some of the methods here given. The cost is so small that every hour spent is well paid. I believe that I have received greater returns from the time used in seed selection than in any other thing done on the farm.

A Member: You spoke of a yield of 2,200 bushels per acre?

MR. DEAN: 2,240, I think, is the European record, per acre. The Maine record is somewhere around 1,000.

A Member: Has it been tried out which is best, to plant early or late?

MR. DEAN: No two seasons are alike. What might be right one season would be wrong another, but I think you would get by far the best seed by planting late. The seed which matures in the extreme hot weather of the South, or possibly in southern Pennsylvania, is maturing under conditions not favorable for the vitality of the potato to plant the following season, but the seed which matures in October is maturing under much more favorable conditions. In the South they get a seed practically equal in every way to the seed imported from Maine, and to store up vitality and plant an abundant supply of humous in the soil in any way in which you can obtain it is very essential. This humus supplies plenty of water for the plant and by its use plant food is made very readily available, and so the plant is enabled to pass through the most dangerous period of its life. The methods of cultivation which I find very successful are fall plowing, turning under a large amount of oat straw—oats and clover—turning under a heavy clover sod. If you can't grow clover, grow heavy timothy sod or red top; that is better than nothing. You need a large supply of humus for the potato plants.

A Member: Do you know that the red top roots will grow right through the potato?

MR. DEAN: I am speaking of snake grass.

A Member: I know; I have had experience.

MR. DEAN: The largest crops I ever got were on the red top soil. I have never had that trouble with it.

A Member: Would you prefer turning the clover sod in the fall or in the spring?

MR. DEAN: Personally, I would prefer the fall, and under your conditions so much further south now mark you, I am over the State line in the middle of the north, and in that climate I can afford to leave my ground bare over winter. So much further south, bare ground open would be a serious matter, wouldn't it, Mr. Martin?

DIRECTOR MARTIN: We regard it as such.

MR. DEAN: On the other hand, the great disadvantage of a cover crop is that there is so much temptation to get humus growth by letting the cover crop stand. I disk the cover crop up the first minute it will stand the horses' feet and keep on saving that moisture the whole spring, because I need every bit I can get. In regard to other methods, spraying potatoes in New York State is a very good method of conserving vitality. Now, I am not able to find whether in southern Pennsylvania there has been any extended experiment, definitely, to find out whether we get here what is certainly found in New York, a tonic effect or Bordeaux mixture. Certainly, in the latitude of Geneva, Bordeaux mixture has an effect in dry, hot seasons, very largely increasing the yield of the potato crop, and this in addition to the saving of late blight. It is another proposition entirely, and there is a third plan of spraying, that by the use of Bordeaux and Paris green together we can kill bugs cheaper and easier than any other way. Now, as I see, this is a very intelligent audience, and I will make a statement I do not often like to make in public; I have used 70 pounds of Paris green on potatoes in four years and scarcely seen a potato bug, but applied in connection with Bordeaux, half a pound an acre is enough. The Bordeaux spreads it all over the leaf and sticks it there, and applied in connection with Bordeaux, there is no burning from the acidity of the Paris green.

A Member: How much Paris green could you put into 50 gallons of 450 Bordeaux before it would burn?

MR. DEAN: In making the Bordeaux, I do not use any definite amount of lime, but enough to neutralize it.

A Member: Do you know how much Paris green you could use with your Bordeaux without danger of burn?

MR. DEAN: I should regard the amount as immaterial, because it takes such a small amount to kill the bugs that I would not care to put in much.

A Member: I have used two pounds of Paris green and not killed the bugs and have used a half a pound and killed them.

MR. DEAN: It was not so much a question of Paris green as of bugs. If they have just hatched out they are easily killed, but if they get a little larger growth they will fairly thrive on Paris green. I have seen people put on three pounds and it didn't kill them.

A Member: Often Paris green is not ground fine enough, so that the particles will get into the mouth of the bug.

MR. DEAN: Well, perhaps I have got a different kind of Paris green, but I never had any trouble at all with the finest.

A Member: I think your success is due to the fact that you spray so frequently and get the bugs before they get any size.

MR. DEAN: When I see the eggs on the vine, I delay the spraying a day or two in order to catch them just at the time they are out; that is a little point, remember. Now, the potato plant is subject to many diseases. We have the common scab, the ristonae, which is all over the country, black leg, fusarium wilt, and blight. Against two of those diseases we can disinfect. Against the common scab, disinfection with the formalin solution is all right. Against ristonial disinfection with corrosive sublimate is all right. Against the others we cannot disinfect.

A Member: Why do you make a difference between corrosive sublimate and formalin solution on those two diseases?

MR. DEAN: The corrosive sublimate is a deadly poison and many people dislike to use it, because they are afraid of the stock eating the tubers, so if you don't have much ristonae and wish to control scab, the formalin is very satisfactory for that purpose. Sulphur sometimes has a little value for disinfection; at other times, not much. By the way the State of Maine averages 1900 pounds of fertilizer, high grade fertilizer, to the acre. They average 260 bushels of potatoes to the acre, which is larger than the crops of Germany, of which we have often heard. We can do a great deal towards those large crops, although we cannot quite equal them, by using the right methods.

Gentlemen, I have tried something in the last three years which I think is well worth the attention of every potato grower, though it is hardly definite enough yet to advise fair and square. I have been trying the practice of ploughing under any fertilizer, applying the fertilizer to the top of the ground, disking it in thoroughly and then ploughing it under. My object is to draw the roots down and spread them through the soil. Often we feel that fertilizer applied to the surface over in the drill row draws the roots up so that when a time of drought comes, the roots are all at the surface and there are no roots in the ground, and what little moisture we have in the soil is certainly not in that top surface soil where the roots are, and I know that in 1913, when so much of the potato crop of New York State was ruined by drought I had the heaviest crop in that State and I attribute it entirely to the fact that I had the roots down.

A Member: Was that applied in the fall?

MR. DEAN: No, in the spring.

A Member: Then you don't plough in the spring?

MR. DEAN: Oh yes, I disk all through the whole spring, and at some time during that disking, apply the fertilizer.

A Member: Well, you plough in the fall?

MR. DEAN: Yes, sir.

A Member: Then you re-plough in the spring?

MR. DEAN: Yes.

A Member: How deep do you cover your potatoes?

MR. DEAN: They are covered eight or nine inches, above the seed, but they are not over three or four inches below the level of the flat surface of the soil and that is dragged down in a day or two afterward.

A Member: You say the tuber was only three inches under the level of the soil after you finished planting?

MR. DEAN: There is a ridge and if you level it down with your hand, you will find that the tuber is only three inches down.

A Member: I'd rather have it concave than a ridge.

MR. DEAN: That is better, yes, but there isn't any tool to do that. The quantity of seed used to the acre depends upon the price of seed. For example, seed is cheap this year and a large amount of seed to the acre is a good form of fertilizer; in dear seasons, it might be a very poor form of fertilizer.

A Member: Just a question here; about what quantity of seed to the plant—say we plant by ridges in the hill—how many ounces of seed would be the limit of the amount we could afford to plant? Have you ever figured it?

MR. DEAN: No, that would be variable with the price of seed.

A Member: I heard a man once make this announcement when he started out to talk on potatoes, that he grew an average of 400 bushels to the acre and cultivated 80 acres. Some one asked him how much seed he used. He said twelve bushels or fifteen at the extreme, and then he went on to say that he liked to have a potato near a crown and cut it in four pieces, and when you figure it out, that takes fifty-six bushels of potatoes to the acre.

MR. DEAN: It is quite possible we could use a larger amount than we now use, very profitably. Here is a little point for the potato grower; they have in Colorado a tool called a cutting box, a hopper on legs with a throat in the front and you sit in front of it with a fixed knife and pull the potatoes against that knife and you can cut twice as fast as with a hand knife. You have perfect control over the eyes you get on each piece and you can always get your seed divided on your best eye so as to have just as many to the hill as possible. You can get it in Colorado Bulletin, 176.

A Member: Would you plant the small potatoes as much as the large ones?

MR. DEAN: It is practically safe to plant them if you have them, but I don't have them.

A Member: You would not select that hill if it had small ones?

MR. DEAN: Out of 500 bushels that I hand-picked last fall, I probably didn't have a peck of small potatoes in the lot.

A Member: I would like to know if the natural type of that potato is oblong? I mean the Uncle Sam variety.

MR. DEAN: That variety runs in a whole lot of different types, there is a lot of variation and yet it is identical because the sprouts, the seed blow and the top are all the same.

A Member: You cannot tell another man how to pick out the best hill, can you? He can usually do it himself?

MR. DEAN: He can do it himself.

A Member: In selecting hills, you would take a hill with four or five medium-sized potatoes in preference to one having more small ones or those very large ones?

MR. DEAN: I usually select from six to eight.

A Member: Can you tell me why this last season the set was small on all sorts of potatoes?

MR. DEAN: I would like to know myself.

A Member: Isn't it because it was dry?

MR. DEAN: I don't know. I wish I knew what the trouble was.

A Member: Do you think you can control fusarium by taking out the diseased tubers?

MR. DEAN: You can do very much toward controlling it.

A Member: You can't get it out of the soil?

MR. DEAN: Oh no, the trouble with fusarium is that it is such a bad disease that the most important thing to do is to keep it out, and this method of going through the part of the field you are going to use for seeding next year and getting it out in September, is one of the surest ways there is. You can cut your seed in the spring, but why not cut the dog's tail off behind his ears? Get them out in September when you have got six or seven or eight in the hill, and be done with them, and you won't have to look over that ground every time.

A Member: Do you think there is any danger of carrying the disease?

MR. DEAN: Personally I dont' know. I keep a pail with a strong solution and if the knife goes through a potato in any way diseased, I put the knife in the pail.

A Member: How is the Rosette, that the New York people talk about?

MR. DEAN: It is advocated quite a lot, but men I have seen that raise it don't think it is quite as good, but it will probably be worth trying. Eastern city markets will pay the highest price for a medium-sized potato. Eastern city markets discriminate more against a potato because it is large than for almost any other reason. They also want it to be flat or round or flat and round, short or oblong and of good cooking quality. That is where you fellows down in southeastern Pennsylvania generally get a pretty high price for your potatoes, because they cook well.

A Member: By the careful selection of the earliest hills, it is possible to shorten the season of maturity?

MR. DEAN: It certainly is possible.

A Member: I believe I have done it, but I am not positive. It is either a change in the climatic conditions of the location or a change due to careful selection, but we get them ten days earlier than I first got them.

MR. DEAN: Out at Alfred College I ran across an old gentleman who shortened his earliest hills of Early Rose for a good many years, and in selecting hills of Irish Cobbler or Early Rose it would be essential to select hills of high yield.

A Member: You speak of digging seed potatoes before they are thoroughly matured; in what condition would you want the vines?

MR. DEAN: Well, the vines would be dead, the succulence practically out of all the stems; the skins would sweat a little, yet you couldn't do that in a season when the blight was on, in a subsequent season; it would be necessary to wait awhile and dig on one of the wet days we often get to dig in.

A Member: At what time do you plant?

MR. DEAN: Under normal conditions, about June first.

A Member: For the late crop?

MR. DEAN: Yes sir.

A Member: What do you know about Paris green injuring the vitality of the potato?

MR. DEAN: I don't know anything about it.

A Member: Why don't you recommend that as a bug poison?

MR. DEAN: I am rather confident, however, that the average use of less than a pint of Paris green to the acre year after year, counteracted by the use of lime won't injure it very much.

A Member: How many bushels of seed do you plant?

MR. DEAN: In seasons when seed is cheap and abundant, fifteen or seventeen; when it is dear, I get down to ten or twelve. I firmly believe that a man with a good market near a large city can often profitably use a larger amount of seed. In Europe the average amount is twenty-seven bushels, but I haven't got the nerve to recommend that. There isn't any one subject in seed potato experimentation that has been more thoroughly tested than the amount of seed potatoes to the acre, and it is shown that the insistent use of large amounts until you get up to forty-five bushels per acre—using my variety and with the condition of soil I have, I began in 1905 planting twenty-four inches apart and got down to fifteen, seventeen, thirteen and am now down to twelve. I am aiming to produce the right size of tubers for my market. If you had the Green Mountain type, you'd want to plant further apart.

A Member: What about Carmen No. 3?

MR. DEAN: Just about the same thing.

A Member: You would plant a foot apart in the row?

MR. DEAN: I would. I dont know whether my neighbor a mile up the road who has got a market garden, would plant closer or not; it depends on the richness of the soil.

A Member: The richer the soil, the closer they will stand together.

A Member: Is that the only thing against a cover crop, the tendency to allow it to stand too long in the spring?

MR. DEAN: Of course there is the cost of the seed, the labor and of the humus destroyed.

A Member: I always put on a cover crop.

MR. DEAN: Frankly, if I lived in southern Pennsylvania I would use a cover crop. I live in New York and don't use it; it is just a matter of climatic conditions.

A member: Do you use commercial fertilizer?

MR. DEAN: One ton to the acre; this year I cut it down to fifteen hundred pounds because I got potash; I used the same amount of fertilizer this year of potash that I did last year on most of the land, but I did not want to increase the amount because I was afraid that the use of so much phosphate would shorten the life of the crop. You know yourself that the phosphate shortens the duration of a crop.

A Member: How much do you use in the row?

MR. DEAN: It is all put on the top of the ground and ploughed under. That is something which is new, and Mr. Martin will bear me out and perhaps it would not be advisable to go out and say that I advised it; for a short amount of use, I found it a good thing; but if you are going to use less than three or four hundred pounds to the acre, applying in the rows is all right; when you get up half a ton, I would much prefer to have it broadcast to draw the roots out all through the soil, and personally I believe that putting fertilizer under deep is very valuable because it draws the roots down; certainly in August when we had that extreme hot drought that we almost always get, we don't want the roots up in the top of the soil where there is not any water. If we have them down, they will take advantage of any water there and stand.

A Member: Did you say how you would cut the potatoes to use for seed?

MR. DEAN: Exactly the same as the rest of the seed. The eyes on the extreme end of the tuber give a larger yield than those on the rest of the tuber, and so it is advisable, so far as you can, in cutting seed, to get as many seed having those end eyes as possible. Of course with a machine planter you have to have pieces of about the same shape and I very often cut small-sized tubers into three pieces having one piece across the butt end of a little larger size than either of the others because it hasn't got the eye, so I give it a little more material to work with, and then have two pieces with seed end eyes on, and very often six pieces, the seed ends quartered lengthwise and the butt end, half.

A Member: Would the same effect be produced if that potato was cut before there was any start of reproduction in the end containing the terminal bud?

MR. DEAN: Same thing.

A Member: I think the stem end would be weaker because the other has started in advance and exhausted the vitality of the stem end. I have made experiments for five years by taking two sections of the potato and the climatic conditions of that season controlled it entirely; those nearest to the terminal would come earlier and then a dry spell set in and these came and the stem end would have the advantage of that and vice versa. I conducted that experiment five years and it proved to me that there was nothing in the different ends of the potato if given the same chance.

MR. DEAN: At Cornell for five years the seed end eyes have always given the largest yield, with the exception of last year. Last year they sprouted something terribly, their seed end eyes sprouted first, sprouted their life all out, and then the butt end eyes yielded the most, they had not sprouted as much yet.

A Member: What do you do with the potatoes to keep the sprouts back, when you plant them in June?

MR. DEAN: Use some ice in the cellar, for one thing, and keep the cellar just as cool as possible early in the fall. Now there is a point—the potato plant has a certain period of dormancy and if we keep our cellar cool early in the fall as they are dug, if possible, we will prevent them from getting over that period of dormancy; then keep the cellar cool all winter and just as cool in the spring as possible, always open the doors at night and shut them in the day, and then by using a little ice in the cellar I find I can keep my sprouts fairly well.

A Member: But you wouldn't find the ordinary farmer in position to do that.

MR. DEAN: I am an ordinary farmer.

A Member: But when you are raising ten acres of potatoes, that is not ordinary.

MR. DEAN: One member suggests that you bury your seed. I have never done that, but I know it is advocated very much and done very much in Ohio, where the conditions are similar to yours, but I have never done it. Cold storage, if the storage is well done, has no detrimental effect on a seed. The trouble is that you are trusting your potatoes to somebody else who doesn't know very much about potatoes, and it is likely that something will happen to your potatoes that happened to a friend of mine last spring when they ran so far down that he got about two-thirds of a stand. If you are running a storage plant yourself, you can watch it, but that man does not appreciate how essential it is that the temperature should not go below 32.

A Member: At how low a temperature would you keep them if you had a plant of your own?

MR. DEAN: As close to freezing as I could. I am planting with a planter that will handle large pieces this year. The Iron Age has got out a planter that will handle large pieces and I have got it. I will put the amount of seed this year up to about twenty bushels.

A Member: Which do you prefer, stubble ground or clover soil?

MR. DEAN: I prefer to think of potatoes as part of a rotation in which the idea of trying to get humus is an essential thing, so that the potatoes should follow some grain crop if possible. On dairy farms, men often have them follow corn which has been heavily manured, but whatever the method of growing potatoes, humus is something that is very important. We all realize how potatoes wear on ground very hard.

The CHAIRMAN: Now, ladies and gentlemen, this brings us to the close of the program for this session and we will proceed into the Ladies Session and the first subject is "Efficiency in Home Making," and I have the pleasure of introducing to you Dr. Hannah McK. Lyons, of Lincoln University, Pa.

Dr. Lyons presented the following address:

EFFICIENCY IN HOME-MAKING

By DR. HANNAH McK. LYONS, *Lincoln University, Pa.*

Mr. Chairman, and Members of the Institute: There is a saying "that the perfection of art is in the concealment of art," and I think sometimes if this is true anywhere, it is true in our homes, where our efficient worker is able to keep the little details, the little bringings together that makes the home perfect, out of sight, as it were. You say, "But we don't want to conceal art." Neither do we, but after all I think if I bring you an illustration just out of the many meetings that we attend in a year, you will catch my idea. For example, one comes to preside at a meeting and manage it through and a large part of the time perhaps you are just grated on the least little bit. They are always making excuses for the person that is not there and what they intended to do and meant to do and tried to do. Again, you go into a meeting and your presiding officer somehow never makes excuses; at the same time they have just as trying things to manage; but it is always the thing we are going to do and that we get done that they present to you. And so in home making; if we may keep out of sight the little things that we meant to do and have not quite accomplished and always bring forward to view the things that we are accomplishing and that we are doing, it seems to me that that is real art and yet it is the concealment of art, as it were.

Within the last few years many new words have been coined and brought to us; at least, if they are not entirely new words, they come to us with a new force and new meaning. I think you will recall not so many years ago when we all began to use that word "strenuous;" it was the *strenuous* life we were leading, or someone was leading. Again, I think you recall when we began to use that word "conservatism" so much, when we were conserving the public interests, that is the great natural resources of our State. Again it is the word "efficiency" perhaps that we are learning to use with a new meaning, and so I believe that that word "efficiency" belongs to the home just as truly as it belongs anywhere. Somehow we women in the home feel—well I think we have been taught to feel that and we did it and we do feel it perhaps yet, that somehow the home did not amount to just as much as the farm; that somehow the home was not just the real thing and the whole thing perhaps. But you know things have changed and to-day you and I know that the home is just as important as the farm and that the home-maker ought to be trained as well as the farmer is trained; that the home-maker must know her work and her duty there if the farm be all that it ought to be.

Not very many years ago I think you recall the papers coming out with the story that where a certain piece of work had been done with perhaps six motions, that that firm was now able to produce the same thing, just as good in quality, with four motions, and so that news was heralded all over the world, and it was a wonderful thing that now, with just the four motions, as it were, this piece of workmanship was being turned out. I wonder if any of us have ever tried in the home just how many motions it took to do anything, and then whether, after realizing that we have used up a good many motions, we have tried doing the same thing right over again and using just half that many motions or a less number? And then, friends, if you have succeeded in doing it with a less number of motions, may we not herald to the world that a woman's work, a certain part of it, may be done with less motions; and if it is done with less motions, may not every woman know it, that the fatigue and wear that comes from this constant keeping on and on and on through the many hours of the day may be relieved and that she may find time for enjoyment, for reading or for something else? Have you ever watched two women at work, how one goes about and there seems to be continually that lost motion—not lost motion exactly, but too many motions? Lost motion I mean because she uses so many motions to accomplish a thing, and yet here comes our efficient woman doing the same thing and every movement she makes counts. Perhaps it is only clearing away the dinner table, but she never allows her kitchen table to get in such a clutter that she has to move this and that and the other and then move it back again and then change it on to her tray to go to the cellar, and perhaps the one article has been moved three or four times to get things in order before her tray is ready to go to the cellar or the storeroom or refrigerator or wherever you put it in its place.

See that the kitchen table is kept so that the thing here goes exactly to its place while we find it with our small people who are helping us and that we are training to be efficient workers, or the first thing you know the table is all in a clutter and you have to make half a dozen motions perhaps before you can bring order out. And see the extra work you are making, the extra fatigue there is because you are not efficient. Again perhaps it is housecleaning time and we have come into that time of year that we dread so much, but our efficient worker does not have her house torn up from garret to cellar, but she goes from one room to another at a time and perhaps the first thing she has attended to is her storeroom. The storeroom is in apple pie order and just ready for everything. When she cleans the room here on the second floor, the bedding is ready to be packed and it is pretty slow work this year, isn't it friends, because the weather has been so cold that we could not clean house really and do it right, but nevertheless our store room is ready and when the time comes for the winter clothing to go away, the store room and boxes are ready; and immediately, when they are ready they may be put yonder where they belong, the blankets may immediately go yonder where they belong; there isn't that lost motion of airing things and getting them ready to be put away and then piling them here in this room and you have got to do something there and they must be piled yonder and covered up from the dust. There is a continual lost motion there that is not counting for anything, and so I believe our worker who believes in efficiency is not doing that sort and I care not whether it is in the home or on the farm, it is all the same after all.

Again I think sometimes that one of the reasons we women have not thought so much about this matter of efficiency is because there has been no money value in our time. It has been simply a question of just crowding into each day all the duties we could get there. It has not been the thought of doing this and this to-day and to-morrow we turned around and had certain duties that might be done that day, but we just crowded each day as full as we possibly could; we had no thought of how tired we would be, the fatigue that would come by that crowding and crowding and crowding and fatigue never spelled efficiency, I care not whether it is in the home or on the farm, if you are fatigued you are not going to be fit for the duties to-morrow, if you have crowded to-day so full that your muscles are worn threadbare, as it were.

Just last week when we were getting ready to come away and things seemed to be crowded so full, I happened to go into Oxford, the village nearest to us, and in meeting a friend there, she said, "Now, you are in a hurry?" And I said, "Yes, rather hurried." And then she stopped and said, "But Mrs. P., my friend, says it is not right to be hurried so. If you hurry so and get very tired, you are not fit for work to-morrow and you cannot do your best work." I said, "No, I know that is true, but what are you going to do to get through when this and this and this has got to be done within 24 hours?" She says, "It is not right;" and so it is time we women learned that we had a money value, as it were, put on our time, and when a money value is put on our time—and, friends, it is worth money—but when a money value is put on our time, then will we women consider the things that we do and the things we don't do. For example, we will not spend time darning a pair of hose that you can buy two pairs for a quarter and will not last half or a quarter the length of time that a guaranteed pair will last and perhaps only cost half as much more. For example, when we think of our time being worth money, we will not spend two and three hours a week kneading the bread as it were, but for $2.50 we will have a bread kneader that will knead the bread just as well and with one half the energy spent in it. Again, we will not spend hours, as our mothers did, with the chopping bowl and knife, chopping, chopping, chopping, you know to get that cabbage or pickle or whatever we are making just in the right condition, but we will use the little food chopper that perhaps you can buy for half a dollar, or a very good one for $2.00 or less money even, and you will do the same work in much less than half the time, because we housewives have learned that the little chopper is one of the most economical things we can have, especially in the saving of time, and so I say we will consider the things that we do and the things we won't do when we learn that our time is really worth money.

Again, we will take care of the small things as we go through life, so as to watch the time that is being spent in doing things. For example I watched in a home not so very long ago when dinner was being served and I happened to be wandering around and not a cooking utensil was filled with water when the meal was over and the dishwashing was not an easy task. I think sometimes when I talk these things to the gentlemen they think it is pretty tiresome, but after all, men, if you washed the dishes you would know just what it meant if the dishes were put to soak immediately when the dinner was being served rather than left standing to be taken care of after the dinner is over. It is the little things after all, that make the great sum of the day, that make the big things when the day is over. It is the little things that spell fatigue or spell efficiency when the day is ended, as it were. In the home the guest was preparing onions, she happened to be visiting there and was preparing onions for the meal and the little daughter who was being trained for mother's efficient helper was wandering around watching the guest very closely, just as the little people do, you know, and not seeing her make the motions that she was trained to make—and you know how these little people are always ready to pass on things much more quickly than they are willing to do them themselves, and looking up, she said, "What is the first thing you do when you start working with onions?" And the guest, in astonishment, said, "I'm sure I don't know." And she said, "Always wash your hands and knife in cold water." She had learned her lesson but did not always practice it and so it is these little motions that count after all.

Sometimes we try to think that it is only in the great workshops that this word efficiency applies, and sometimes we think that our kitchens and our homes are not great workshops. But, friends, when I tell you that there are more than 18,000,000 people enployed in homes—and I don't mean just the mere servants employed there, but I mean the home-makers and managers—that there are more than 18,000,000 in this country of ours, then I believe our homes are a great workshop where we need to study efficiency in method, where we need to put more study on the subject than we have been putting on it.

And again, when I tell you that more than ten billion dollars is spent in food annually, isn't it time that we studied these questions of efficiency for the home? How much of it do they tell us is wasted annually? And is it any wonder, if you will just think for a moment of all the home-makers, of all the managers of homes of this 18,000,000 how many have been trained for their positions? If you will think for a minute how many you know that have been really trained for the position into which they have come, I don't believe you will count very many. So, friends, is it any wonder that mistakes are made in this business of home-making? Is it any wonder that there are little leaks, yes, big leaks and is it any wonder that wrecked homes are the result, sometimes? Very frequently in the great workshops they employ an expert to come there and that expert will stay for days in the workshop looking around and studying their methods of business and ferreting out where the little leaks are that these leaks may be remedied, that they may produce with less cost just as good an article. It seems to me that with the little opportunities that the women of this country have had to be trained as home makers, the little chance they have had to be trained in real methods of work and efficiency, wouldn't it be nice if we could have experts come into our home and show us where the leaks are? And when I say leak, I do not mean always where you are spending your money unwisely or where you are just using your food not wisely perhaps, but I mean where this lost motion is, where you are doing a thing over and over as it were and just one effort would do the work, and then it seems to me there would be hours left for the training of the children that so frequently we hear mothers say, "I don't neglect a thing in my home, but I haven't time to train my children." Well you know I believe that the home making, that is the dusting and sweeping and some of that work, had better be left undone than the children's training left undone. It seems to me that had better come first, but nevertheless I believe that if we only knew the methods a little better, if we only knew some of the things, the how of it a little better, that we would have plenty of time to do both.

Unfortunately we women are not mechanical, as a rule. You will find it occasionally that we are, but as a rule we are not mechanical, and it seems to me that there the brothers can come into the home making with such splendid results. May I give you a homely illustration just there: A wife became sick; she was the chicken raiser of the home; and as the small potatoes and kitchen refuse was kept for the chickens and heated you know, cooked up as they do sometimes and meal mixed, she just mixed it in the vessel in which it was put. Well, we women know how the meal will get spilled around the floor and won't mix very well and how long it takes to do it; but when she became sick her husband had to feed the chickens during that time and there was a splendid little trough built in the corner of the entry near the feed box, and some remark was made about it and he said, "I never bothered with that pot a day." It was all right, she had bothered with it for weeks and he had never seen it, but when he had the chickens to feed and the food to mix, he saw it. So, men, suppose you see a little bit before the wife gets sick and do these little things that count so much for efficiency and will mean so much for time and help to her after awhile. Many times a great deal of the lost motion in efficiency is in the arrangement of our homes, especially our kitchens, where we spend so many hours of the day, and here with our kitchen table as it were in the center of the floor or near the stove, where it ought to be or must be, might be grouped or ought to be grouped the stove and cupboard and the things we must go to back and forth, so that there will be just as few steps as possible to be taken in that home.

Many times efficiency may mean simply planning. It is not that you must know so much of great things, but simply that you will plan and be willing to plan. When we get up in the morning and start out for the day's work, if we don't have a picture of that day's work, a mental picture as it were, we will not accomplish in the same time nearly so much, but if you sit down with pencil and paper and write out the next thing you would do and the next thing and the next thing, you will find that at the end of the day you have done quite as much as you would otherwise have done. Somebody will say, "But I have no time to take pencil and paper and write out what I have to do;" but you have saved more time than you have taken in writing it out and planning it out, by the mere fact of sitting down and writing out and planning out, and this is especially true where there are children to train and child helpers. If you will jot down with pencil and paper the next thing and the next thing and the next thing that is to be done during the day, the children somehow will take it up and will not forget and will be much more efficient helpers than if they try to remember and try to just go along and go along as it were picking up here and there and not knowing whether there is anything to be done next until they have been called and been reminded that they have been very remiss.

And so we might go on with this word efficiency and find all the way through the day's work and the year's work that it fits in everywhere. But that we women need to know more of the methods of efficiency, and that bring efficiency. Several times during this last winter in my work, if I may come to a personal remark or two that has been made to me, someone will say, "You always talk for the women; don't you believe the men belong anywhere in this plan of homemaking?" I certainly do believe the men belong in this plan of home-making and I fully believe that no home is complete without the man element and the man nature in it, just as you men know a home is not complete without the women in it; in fact you have no home, no real home, without a woman in it. So do I believe that no home is complete without the man in it, and we only have to remember the homes where the men have gone out and the sorrow and the loneliness and loss that is there, to know the one is not complete, that no home is complete without both natures in it. You know the little couplet that says, "As unto the bow the cord is, so unto man is woman; and though she bends him, she obeys him; though she draws him, yet she follows; useless one without the other." And what is true in the home, friends, I believe is true everywhere. Men and women were meant to live togther and work together and we cannot seperate them. It is not a question of efficiency here for the woman and efficiency there for the man, but both working together that brings out the true efficiency in the home, the true efficiency everywhere there is work to be done in this world of ours.

I was interested not very long ago in an article about efficiency in the business world, where a business journal was advising the business world what would bring efficiency to business everywhere, and it seems to me that the very thing that will bring efficiency in the business world, will bring efficiency in the home world, and so may I give you the thought that you cannot get the most out of your business unless you are able to get the most out of yourself. You must feel right; you must be on your tip-toes all the time; and yet I know that many will say, "I couldn't work on my tiptoes all the time." It may be too much to expect that a man shall be right at his highest efficiency all the time; but that is the mark at which you should aim; in other words, if you cannot be on your tip-toes all the time, keep yourself there as much of the time as possible; keep yourself there not by working on your nerve, but by keeping physically fit so that you can develop high efficiency without speeding up the engine too fast. In automobile language, we are told that you can keep on high speed as easily and as economically as on low if you use the right grade of gasoline; and the right grade of gasoline in this case of efficiency for us friends is simply a combination of natural diet, pure air, recreation and the glad hand for whatever life brings to you; and I believe there is so much in that question of the glad hand, the facing of the things we have to meet and facing them believing that it is all right and that you and I can face them and that we will put them through in a manner that is wise and well, because efficiency is the word that means the things that are to be in the home and the training that we women ought to have.

DIRECTOR MARTIN: Mr. Chairman, I notice a gentleman who has charge of our splendid agricultural paper, here; I refer to Mr. Anderson. Is Mr. Anderson in the room? We would be very pleased to hear a word from Mr. Anderson at this time.

The CHAIRMAN: We would be glad to have Mr. Anderson come forward. I have the pleasure of introducing Mr. Anderson.

MR. ANDERSON: I am sure it is a very great pleasure to be with you. I have met nearly everyone here, I think, and have bored a good many of you with private conversation, and it does not seem right that I should bore you any more just at this time. I want to congratulate the Superintendent of Institutes on the splendid program which he has arranged for this meeting. I think it is one of the best balanced that I have known for a meeting of this character. I thought so when the announcement came out and I am more certain of it after having enjoyed the portion of the program which has already been given.

I want to say relative to the last talk that was given that it is a very important part, it seems to me, of Farmers' Institute work, it is a very important part of agricultural development work, that some attention, some time, some opportunity be given for the discussion of the phases of agricultural work pertaining particularly to the farm home. I have been impressed with this one thing—we have heard in recent years a great deal about keeping the boys and the girls on the farm. A great deal of our educational work, agricultural educational work, particularly in recent years, has been aimed toward the keeping of our young people on the farm, but more particularly the keeping of the boys on the farm. It has been my observation, however, that in the young couples, in the young homes that are established, that more often the likes and dislikes of the wife have more to do with the development of that home and the location of that home, than the likes and dislikes of the man. Now it seems to me that it is a very important thing that in our educational scheme, agricultural educational scheme, more attention be given to developing the likes of the girls for the country and for farm life. If the girls stay there, the boys are going to stay there and it is very important that we look after them.

I want to congratulate the members of this body, the institute men upon the very excellent institute season which has just closed. It seems to me that we hear more favorable remarks of our institute work in this State each year and I am sure that this past year has been a very great success and I hope that it may continue. It seems to me that there is only one thing that is needed and that is a little enlargement in the scope of the subjects that are discussed. We are all accused, agricultural newspapers probably more than any of the rest, of specializing too much on the question of production without giving attention to the other phases which tend toward yielding a large net profit on the farm. We have all got to come to branching out from these old subjects and taking up more the question of marketing, the question of decreasing the cost of production, in Farmers' Institutes just as much as the agricultural papers, and I hope that in future work, we can have more attention given to that. We cannot forget, however, that we have got to keep on repeating what has been said time and again on the question of production. There is always need for it.

Now I am a good deal like the fellow that was walking along the banks of a stream and happened to look down just in time to see a fisherman falling off a small pier into the stream of water.

The fellow rushed down and pulled the fisherman out and asked him how did he come to fall in. He said, "I didn't come to fall in; I came to fish." Now I didn't come here to talk, but I thank you for the opportunity and for your attention. (Applause).

DIRECTOR MARTIN: Mr. Chairman, as you will have noticed, this session of the Institute has been somewhat miscellaneous in character. This is brought about for the reason that we intended and had planned originally for a night session here, for a closing session, having part of this program in it that we have covered this afternoon. The evening promises to be so cold and we have been under an exceedingly heavy pressure here, notwithstanding all the other pleasant surroundings that we have enjoyed so much, the many courtesies that we have enjoyed from the good people here in Crawford county and in this place; yet there is one element among the many elements that we cannot control, as we have learned, and that is the condition of the weather. We realize that and we want to express regret that we will probably be denied the exceptional privilege of enjoying those two addresses that have not yet been rendered by Miss Sara C. Lovejoy, of State College, and Mrs. Rose Morgan, of New York City. I regret for myself and for this audience that we could not have engaged in that exercise this afternoon or to-night. But there is a limit to our endurance, and with the fear that to continue this session much longer might endanger the health of a good many who are here, I want to say one thing, that I have noticed that some of these old boys that are here, have stood up under this pressure remarkably well. I guess they were born in that phase and time of the moon that gave endurance.

A Member: Going to stay there, too.

DIRECTOR MARTIN: Yes, and we appreciate at this time the attendance, the full attendance of the County Chairmen of Institutes and the lecturers. I want to say to you, my friends, since our friend, Mr. Anderson, mentioned it, the efficiency of the Institutes during the past year, whether my ideal be a low one or a high one, has appealed to me with greater force than ever before in the sixteen years of my service, not that the attendance was greater than in some other years, though it is pretty near up to the highest attendance that we have ever had, but there was a marked interest in every county of the State as to the questions and the subjects that were discussed there as to bringing about the very best methods to be employed. We have a large list of these questions, showing that the mind of the farmers of Pennsylvania is leading to the question, as our good lady has expressed it, of greater efficiency along every line. And indeed, my friends, these Institutes are organized and carried forward for the very express purpose of developing a better agriculture, a better farm practice and having higher and better development of the farm homes of Pennsylvania. To that end they are giving—and I might say that we have come to the time in the history of this part of our State organization in which not only shall we learn of greater efficiency and plan for the adoption of better methods, but the time has come when we must learn to co-operate one with the other in such a manner as not only to grow better and greater crops, but see to it that those crops reach the better markets at the less cost. These are questions that are coming up before us, and future institutes, in my judgment, will progress along these lines; not that we shall lose sight of the one, but we will get a broader vision of the other side.

My friends, you may be interested, since it will not be possible to hold another session, you may be interested in knowing something, just in a few brief words, of the attendance last year throughout the State. I would say that the attendance at what is known as our regular scheduled Institutes was 165,280. Then we have a system, you know, of Movable Institute schools. The attendance at these schools was 11,908. We have another system working as a wheel within a wheel, of Special Institutes. By the Special Institute, we mean the institute either after or before, the regular institute season, in which the people called for additional work in various communities, and when we send one or two or more speakers to attend that meeting, organized in some home location. Now at these institutes last year, there was an attendance of 9,456. Thus we have a total attendance at our institutes proper, of 186,644. This is not a packed report; we get this report from the leader of the section of our Institute Lecturers, and additional reports from the County Chairmen of Institutes. Then they come to the office and we compare these reports. If we find any great variation, why of course, we inquire into it, so this is the actual report as verified by two sets of reporters.

In addition to this, along with this work, there were 400 days of institutes carried on last year and divided into 218 sessions. The special days for the Special Institutes were 15, with 11 sessions, and the Movable Institute schools were 29 days with 7 sessions. There is something very interesting in part of this brief report. Possibly you may be interested in knowing just what counties gave the largest attendance at Institues. I want to say that for the past two or three years old York county has been leading the van; the regular institutes in York county last year—there were 12 days, and the attendance was 12,617. That is a pretty good attendance, there were also Special Institutes held there in which, at one time, there were 3,300, at another time 450, and one at Stewartstown, in which there were some other issues, there was an attendance of 2,327. This, added to the 12,000 attendance in that county, would make the number 15,694. The county having the next highest attendance, was Montgomery, with 5,375; Franklin, with 5,084; Tioga, with 5,015; Lancaster, with 5,996; Indiana, with 4,465; Clarion, with 3,973; Fayette, with 6,380, and in the other counties, the attendance ranged down to 2,000. Now this is only a general report. The attendance according to the population and number of farmers is not large, but I read this brief section of our report to show that the Institutes of Pennsylvania are not only increasing in number, but have become much more vital in the interest manifested on the part of the farmers, all of which is a very great satisfaction to me, and a great proportion of the credit for this great and wonderful development is due to the efficient management of the County Chairmen of Institutes of Pennsylvania who perform the vast amount of this work without money and without price. I tell you that when men are so interested in the development of agriculture as to devote a month of their time in many of these counties to this work, the work cannot fail. We are proud in Pennsylvania of our corps of Institute Instructors. We have challenged the United States and we here throw down the challenge to produce a corps of instructors that can meet the conditions of agriculture to their equal.

Now, my friends, it is with regret, as I said before,—and possibly those two instructors may come on the evening train, and we do hope that since we will be disappointed in hearing them, that they may not be disappointed quite as much as we will be. We deem it best that we should adjourn this meeting about 4 o'clock in order that we can get to moving homeward. And again thanking you all for the manner in which you have sustained this great work in this meeting, I bid you adieu for the present. (Applause).

(NOTE.—Prof. Helmer T. Rabild, of Washington, D. C., was unable to be present at the Normal Institute to read his paper on "COMMUNITY BREEDING," as announced in program of Tuesday afternoon; however, his paper was sent to the Director of Institutes, and same is published below. Owing to the necessity of dispensing with the last session of the Institute, on account of the cold room, the evening program was carried out only in part; Mrs. Rose Morgan, of New York City having been placed on the program for the "WOMEN'S SESSION," which was dispensed with, and arriving after adjournment, her paper, "SONGS THAT LIVE," is also inserted below. A. L. M.)

COMMUNITY BREEDING

By PROF. HELMER T. RABILD, *U. S. Department of Agriculture, Washington, D. C.*

The majority of the cattle of this country represent haphazard breeding which largely accounts for inferior and unprofitable stock. In some neighborhoods an individual farmer decides to grade up his herd by the use of a purebred sire of a definite breed. Another farmer also decides to use a purebred sire, but because he does not want to appear to copy the example of his neighbor, he may buy a sire of another breed. Eventually there will be a community of rival breeders of all the dairy breeds, which is radically wrong. The remedy for haphazard breeding as well as varied breeding is a Community Breeder's Association.

The purpose of a Community Breeder's Association is two-fold:

First, to improve the native cattle by the use of purebred sires exclusively, and purebred cows so far as possible, all of the same breed.

Second, to put their business on a more substantial basis through co-operation.

The advantages of a Community Breeder's Association are as follows:

It is educational. A body of people in pursuit of the same end can profit not only by their own experiences but also in the experiences of their associates. However well informed a man may be he is continually meeting problems that puzzle him. He needs constant advice and suggestions from the brightest members of his association. He needs to exchange views with his fellow-men and to enlarge his perspective. A co-operative association can obtain the services of a speaker from the agricultural college, or prominent breeders from other associations. The experiences, not alone of one community but of many communities enable a breeder to overcome the many annoyances which he must overcome.

An association enables the breeders to co-operate in buying. A group of farmers can buy a bull in partnership and use him collectively. This is a great economy over the plan of several farmers buying their individual bulls and using them on only ten or fifteen cows. Moreover, if a large number of cows or bulls are to be bought for the community a large saving can be effected by having a representative committee of, say three men, purchase the cattle instead of each of the dairymen having to pay carfare and other travelling expenses incurred in the selection and purchase of animals by him for his own herd.

An association enables the members to co-operate in selling. Even though it be a small community it can build up a reputation not only in the country but among all nations. As an example of a small community building up a reputation for the Jersey cattle, we will cite the Jersey Island. As an example of a small community building up a reputation as a Holstein-Friesian center, we will tell about Lake Mills, Wisconsin.

In the consideration of such a subject as community breeding, it is well for us to note what has actually been done along such lines. One of the very best illustrations of community breeding is to be seen in the Island of Jersey. In the year 1789 the dairy farmers of Jersey succeeded in getting passed a law which very explicitly prohibited the importation of any cattle whatsoever for breeding purposes. After 1789 the cattle which were sent to the Island were sent for beef purposes only. They had to be slaughterd within a few days after reaching the Island of Jersey.

What has been the result of such a consistent effort in community breeding? One result has been a steady demand for these community-bred cattle. Cattle breeders from England, Denmark, Germany, France, the United States, and other countries went to Jersey Island to buy cattle because they knew that everybody on the Island was interested in the same breed of dairy cattle. Since everyone there owned cattle of the same breed, buyers were sure to get pure-bred animals. Furthermore, a dealer's chances for filling a large order for a special breed of cattle were good in a community where every dairyman kept the same breed of cows.

Other breeds of livestock owe their origin and development to community breeding. For instance, in the province of La Berche, in France, the community took an interest in the breeding of a certain type of horse. The famous Percheron, which resulted from this community breeding, is still eagerly sought for by buyers from other countries.

Every breed of improved domestic animal that we have to-day is the result of community breeding. Among cattle, we have already mentioned the Jerseys. We might also name, as examples of community breeding, the Guernsey, from the Island of Guernsey, the Ayrshire, from the county of Ayr, in Scotland, and the Holstein-Friesian, from the province of Friesland, in Holland.

A good example of the value of community breeding, is seen in the community breeding of Holsteins at Lake Mills, Wisconsin. Over $175,000 worth of Holsteins are shipped out of this community yearly. In a single year from 40 to 50 carloads of grade Holsteins left this community for Mexico. One buyer is reported to have purchased as high as 800 head. On May 5 and 6 last, there were 125 head of Holstein sold at an average price of $283.56. One bull, King Segis Pontiac Polkadst, consigned at his sale, sold for $6,800. Eighteen animals sold for $375 or above, sixteen for $400 or above, twelve for $425 or above, eight for $450 or above, and five for $500 or above.

Buyers are attracted to such a sale as the one held at Lake Mills, Wisconsin, because they feel reasonably certain of being able to buy in large quantities and also of having considerable opportunity for selection in sections where community breeding is practised. The breeders can co-operate in advertising their stock. If we look through any of the larger dairy papers we will find the advertisement from a community breeders' association. The expense of this advertisement is borne by the association. This is cheaper than a large number of small insertions. The prospective buyer writes to the secretary and the secretary in turn sends to the buyer a list of all the breeders in the association together with the descriptions and the prices of the stock each has for sale. The buyer is then enabled to purchase directly with the least inconvenience exactly the animal he wishes to obtain.

When a community becomes sufficiently interested to take up community breeding, it will very naturally use co-operation along other lines. It will be very apt to develop co-operative feed buying. It will also co-operate in the eradication of tuberculosis, contagious abortion and other contagious and infectious diseases. The spread of such diseases would be very materially check if, in a community, every farmer took an active interest and co-operated with his fellow-breeders in having his cattle systematically inspected. They would also tend to adopt better methods of sanitation and their efforts along these lines would result in a community owning herds that were almost disease-free.

In general, it may be said that community breeding advertises the community, attracts to it a class of large buyers, and, in addition, tends to bring about other less important, but very considerable advantages of co-operation such as co-operative feed buying and a co-operation in fighting disease.

SONGS THAT LIVE

By MRS. ROSE MORGAN, *New York City.*

The child who, grown old, finds himself in possession of the blest traditions and memories of the places and things of his childhood, enjoys a legacy whose worth increases with the years, whose meaning unfolds with life. Probably there is no form of early home influence more enduring than the home song; and its power is continuous in proportion to the place it occupied in that early home influence. The home song, therefore, should be fundamentally a thing of truth. It should not be the woven tinsel of fancy and sentimentality, but it should be composed of words and melody that are coined from the heart's pure gold. Such a song lives. There are few homes in this State where a good song, if once it became installed, would not be appreciated, and there is no home that would willfully cancel or lose the power of that song as a memory-maker and as a character-builder. Unworthy songs have crept in not because our home-making hearts are wrong but because our home-making heads and hands are so full of the work of the insistent present and the foreshadowing future that we do not often stop to weigh the values in songs as in other things.

We believe the song to be a character-making force. We believe that there are better songs for the country school, the grange, and the occasional country-life program than are ordinarily used in them. We believe that there are better hymns for the country church and Sunday school services. We believe, and it is this phase of the question we wish to deal with especially, that the home is the natural center of that power for good which we rest in song, and that there are better songs for it than the average home of to-day provides.

Already work has begun to meet the problem, which our weighing of the values has revealed to us, touching song in the home. The conclusion that the country home should, and can, and will, make a radical change in the character of its songs is being reached by the consent and co-operation of fathers, mothers, teachers, preachers, and others who are vitally interested. These men and women are working to the end that the country home shall be clean of the "praise that cannot purify," of the passing life wherein life's sacred relations are made a joke, of the song that cannot possibly bring a sweet home-memory in the after years to the children who have gone out from the home.

It is true that most of the cheap and vicious songs originate in cities, but all too quickly they find their way into rural communities and homes. During the last two years many persons have gone over the matter together, have given testimony, and have compared conditions and experiences. From data that have been collected it has been found that for some reason it is true that to-day the young people in the country homes are almost or quite as much exposed to the blight and contamination of trashy and filthy songs as if their homes were not aloof from and independent of the sources and sites of such songs. The reason for this has been searched for and has been found.

The fear of not being "up-to-date" in the matter of songs, and the eagerness to have country homes and boys and girls enjoy what purports to be created for the giving of pleasure as exploited in the city, has set country people to hasty and indiscriminate buying of "the latest" music. The unworthy type of city music has been adopted, and it has been called representative; the vast amount of worthy music that is heard at its perfection in the city has been temporarily forgotten. Think of the church music, the operas, symphonies, and oratorios, the concerts and recitals of high grade! Many of these musical entertainments are free to the public and are even organized to be carried free to every part of the city. Think of the great choral societies, the carefully taught music in high schools and graded schools, the chances for the best of training in every phase of music—all of which tends to shorten the life and the influence of the bad song in the city, even though its spread is universal.

Better songs in the country home is quietly becoming one of the working texts in many communities of this State. There is not only the desire on the part of people in rural communities to choose between the good and the bad in songs, but there is the ability when thought and care are given to the judging.

When the trashy song secures a place in the country community, what is there with which to meet and annul its power for lowering the tone of life and the "blessedness of the country"? Perhaps there is a pastor and choir with appreciation of the value of good songs, perhaps there is a high grade music teacher or school teacher. It may be that the community has a patron saint who invests thought and time and patience and money to the end that good music shall meet and conquer the invading bad. The most effective influence for good in songs is the influence that emanates from the home, for it is lasting. The solution of the problem, however, rests largely with the individuals that make up each household. They may show their devotion to the high ideals of the country by refusing to buy, sing, or tolerate besmirching songs of the hour.

> Suggestion is the birth of thought;
>   Thought dwelt upon becomes action;
> Action repeated becomes habit;
>   Habit is character.

Because of the comparative isolation of the country home many desirable features of good home-making must come to it slowly. Its very isolation and independence make it the natural friend and advocate of the good song. Its open windows do not let in, perforce, the contaminating street song. Its doors can remain closed to the rap of a blighting "best seller" until the family within have taken time to pass upon the merits of that song, to discover whether or not it is in harmony with the family's aspirations to secure good things for itself, and whether it voices the family's spirit of independence in the obtaining of these things. Heretofore, the people of rural communities have hardly considered their responsibility in the setting of standards for good home and community songs. Now that the whole American people are working—slowly, it is true!— to the question of good and bad songs for their homes, is it not reasonable that the country people should assume a strong leadership in the matter? Should they not be the ones to say what shall and what shall not constitute their home and community songs?

The meaning of a song is conveyed by the combined force of its words and its melody. In a song the melody seems to give rise to the words and the words to the melody. Men naturally sing of what fills their heads and their hearts. The resulting song is good to the degree in which it suggests the good and the beautiful through its words or melody, or through both. A song is to be neither approved nor condemned because it is new. Nor should it be counted without merit if in actual use it seems to touch the hearts of young and old as it finds its way out into the world. But time and opportunity are as precious as they are fleeting; and what family is there that can afford to rest its family traditions and future memories on songs of uncertain quality when good ones can be had?

Since I have known that we were to have this evening together on "Songs That Live" the local song traditions of Pennsylvania have become of interest to me. And as truly as Pennsylvania has its distinctive people, features and characteristics, as truly are these distinctions written in the historical and traditional songs.

May I say to you at this time that I have made, during the last month, a list of songs which, by content or adaptation, or both, are peculiarly expressive of Pennsylvania and its country life, including some that are not only sentimentally and traditionally, but historically true of the local life of the State. It would give me pleasure to forward to you this list upon your request. Columbia University, New York City, through its department of agriculture forward to me mail addressed to me, Department of Agriculture, Columbia University.

But to-night let us prove to each other how, though local traditions give rise to interesting and long-lived songs, the songs that live and will live are those which we can all share in common because of their appeal to us all. We shall not apologize that the personal must enter in. My home is not one of the type you yourselves know. Its songs are your songs, also because "home songs" are a common heritage and because there is no life so well forward that it has no need of a heritage of home songs we spend the remainder of our evening together talking of and singing songs that live in our hearts as though we were all one large family, looking backward together, looking forward together.

Back in Wisconsin is an old home where six grown children go as often as they can. It has been my habit, as one of the six children, to go at Christmas time, and before the two weeks vacation is over, invariably I find the little chest by the piano side, and that chest is indeed a center round which the family gather. Father and mother were pioneers and they could not carry with them mahogany treasures and the silver and linens from back East. They took just the least possible as pioneers. And yet the children have a heritage, and I would not have it other than it is. The family treasure is the contents of that little chest. Very meager would that little treasure-chest be in some people's eyes; to mine it is invaluable. It contains the old home songs.

I want to say to-night that if you have the same kind of riches, then you have in your mind a great number of songs that are increasingly dear to you. They are the songs of your boyhood and your girlhood, and particularly the songs that you learned in and about your own old home. Now I would not say: "Don't sing this, and that," and suggest nothing of substitution. As workers and leaders you do not need to be taught, but perhaps you do need to be called to sharp account for a thing you know so well and perhaps do not do. So let us gather up some songs, some old songs, types of the world's "songs that live." If you will, we shall go together across to the countries that are older, and get some of their songs for yard-sticks, and then we will hold our own songs by them and see how they will measure up.

Let us go direct to the places where much of our blood comes from, represented here to-night. I have had a great deal of interest in looking up how many Scotch and Irish there are between New York and the Mississippi, and the percentage runs high. Twenty-two per cent. of the families are to a considerable degree Scotch-Irish; some are Scotch and some are Irish, and so we will go to the countries where Scotch-Irish blood comes from, and we will get some of their songs as legitimate song standards for our own country. The first thing I heard, crossing on the boat that took me north was a song that reminded me that the Irish people are a home-seeking, home-loving people. Oh, they are jolly on this side, and they are known as jokers and the men and women sometimes do the heavy work, and sometimes they do the politics (and perhaps that is heavy), and then sometimes they do the kind of thing that brings us up sharply: they do the thing that is so genuine that our hearts run right out, and that is the Irish song. The Irish song that I have in mind was sung by a boatload of Irish folks going home, going back to Ireland. I had first heard the old song years ago; everybody in the steerage knew it and they all joined in. I will sing a stanza of it, and you will all recognize it as a good, clean Irish song. Yesterday I heard the grind organ playing. I looked at the man and he was an Italian; I spoke to the man on the corner, who was listening, and he was a German, but they all knew that tune; it was "Kathleen." What does it mean? It is a home song, and a heart song, and it was written more than a hundred years ago, and while a simple ballad, it is a right kind of a song. Although an Irish-born song it has lived and will live because all nations love and sing it.

I had been on the boat seven days. I was with the others in the dining room the last night,—that is the night of the captain's dinner, and on that night we are all asked to sing our country's songs, and there, *that night,* I learned a lesson I like always to tell because it was distinctly a lesson to me. You know the substance of it already; but let me remind you. It was this way. The Germans were asked to sing, and oh, how they rolled out their song. The French sang their song, and it was as beautiful as silver trumpets, and everybody of the French folk knew it. It came time for the English and they all sang: "God save the King." Then came our turn, and we were the major part of the passengers. We all began to sing "America." We finished the first stanza, and tried the second, but some began the second and some began the fourth, and some began the third, and we giggled and looked at each other, and then we quit. I had training in singing and was going across the sea with my passport to protect me as an American citizen, but I could not sing America's National Hymn. I walked the deck afterwards with an Englishman, and this Englishman said to me something about the song which we *did not sing,* and I apologized or tried to: I said: "We don't sing it as frequently as you do." (You know they close their theaters and the like with "God save the King"), "And you know, we are a new country." He replied: "Yes, indeed, very very new, indeed." And I never since have apologized to an Englishman for not knowing America, every word and every stanza. I learned it, and on the return voyage we did not break down singing America.

But we are still on the boat, where an old priest has said to me: "So you are after songs,—then you must come to our country and come to our part of the country; it is the bonniest place in all Ireland." The song and the place was "Killarney." The man who drove me could drive. smoke, and sing at the same time, and I learned from him the genuineness of the Irish heart in singing folk songs. I learned that all Ireland knows her songs. I met an old turnpike keeper, (who also had his pipe,) and could talk and sing without removing it. He told me he had a lot of songs, and he began singing one, to which I said: "I know that." I remembered away back how I had learned it, how my oldest brother had brought it from college. The old man said: "Do you know Tom Moore?" He sang: "Those Evening Bells," and he pointed out the bells, and he said: "Tom Moore wrote the song right under the shadow of those bells." I was sorry to leave Ireland; a warmer-hearted people never lived and they have, know, and love their songs.

But let us cross into Scotland. We say that "blood is thicker than water." My mother is Scotch, and remembering the Tom Moore of Scotland,—"Bobby Burns," I went to the place where he is buried,—Dumfries. I was traveling in the care of the Kings Arms Hotels, and finding their bus at the station, I sat therein and looked about. Soon I saw two people, a tall lady and a little man, and the lady was evidently giving the little man orders. We later drove in silence to the hotel. I was shown to my room, and I thought nothing more about them. A little maid came up and asked me if I would not come down and have a cup of tea. I went down, and there I saw the tall lady and the little man. The lady said to me: "Will you have a walk with us?" And we started out. Now at home I am rather praised for my walking ability, but I walked and walked with the two strangers, in a strange country, six miles, and very few words were spoken all that while. Stopping finally, the woman turned to me and said: "Have you ever heard "Maxwelton's braes are bonny?" This is Maxwelton, and over there is the little church where he and I were married 28 years ago, and we went straight to Australia. We have just come back to the Islands, and I could not go back without coming to Maxwelton. Mind you it is the bonniest spot in all the world." (The priest had said that about Killarney). She turned to the little man, and said: "Sing," and he began to sing, and in the second stanza the wife joined. They sang the third stanza, both faces wet with tears. After they had finished, the lady said: "Do you like that song?" "Do you know it is the best love song in all the world?" She added: "Go to Edinburgh library and see for yourself." A few weeks later I was there, and saw its record: that for simplicity, chastity, and beautiful melody and words, "Annie Laurie" is the type of the world's sweetest love songs.

My friends, 62 per cent. of the songs that are written now-a-days are the songs that are written about what we call "love," and of that 62 per cent. 80 per cent. insinuate that the divorce court will take care of conditions that are not happy, "so don't be too serious." What kind of a song is that, and how does it compare with the song of "Annie Laurie" which is the typical, clean, fine love song? Only to-day I had a new bit of treasure regarding love songs, and "Annie Laurie" particularly. I talked with a woman who told me that her father, who was a British naval officer in the Crimean war, said that they all stood while over the trenches the boys all began to sing "Annie Laurie," and one of the men said: "I know she is *thinking* of me, too."

I would not leave Scotland in two hours if it were not wrong to keep you so long. But before leaving it I must tell you that in the north of Scotland, I discovered something more regarding our American song-making. The Kiltie band knew that I was there to learn Scotch songs, so with much pains they prepared a program. Thirty-nine Kilties sent me an invitation to come. After the marching and countermarching, the first song was begun,—a bitter disappointment to me, for it was not going to be Scotch at all. With much pains they had prepared an American program. I love American things, but they played for me, with all the appreciation of a thing done to please somebody else, what the leader told me was an American song, and I said: "No, no, no." But he was Scotch, and he said: "I ken it is." And what was the song? It was "After the Ball is Over," truly written by an American. You remember it, and so do I. Then they played a second song, and it was like unto the first. It was: "Hot time in the Old Town Tonight." And they began a third song, and at the close of it they said to me: "We learned that in Germany." I replied: "I think it is the best American song that we have." I wish to speak of it again in just a moment as the best American ballad. At this time the conviction came to me that at home, in America, there are some good songs, and I would go back and try to discover how new we are as a country and how far along we are in song building. So I came back, not forgetting as I passed London that there an American had immortalized himself by writing the best home song that was ever written,—"Mid Pleasures and Palaces," by John Howard Payne.

Hardly had I landed home before I wrote to President Theodore Roosevelt. I had heard that he had said: "If we are to have American songs we are going to have them through the old slave hymn of the South. The colored man is going to give us the basis for our best American songs." So I wrote to Mr. Roosevelt who directed me to get in touch with Booker T. Washington, who would direct my itinerary. I wrote immediately to Dr. Washington, and I said to him: "Will you help me to get the genuine old slave hymns of the South? He wrote back a letter beginning with a sentence that I shall never forget. He said: *"If you are sincere* I shall do all in my power to help you to get the old slave hymns." During that winter he helped me all he could; he told me where to go, to whom to go; he wrote letters ahead. The chief thing I got, let me say, was my own ability more or less to know what a real negro hymn is. I learned it through a very primitive camp meeting. Briefly it was this way. Four ministers arose, and they all preached from different texts, and it was a sort of a case of the "survival of the fittest," for one by one they dropped out, and the remaining one proceeded to sing the rest of his sermon, repeating his text as the main stanza, the audience composing and harmonizing the chorus.

At Farmers' Week at Cornell last year, after we had had three or four days of talking and singing songs that live, one young man spoke to me. He was to be married next June, and he wanted to know about songs that would be good for his home. Together we made a list of songs with which to start the new home. Shortly after that an old man came to me. He was white of hair and white of face, and feeble of manner, and he said to me: "I like the songs you have been singing all week, but somehow my heart keeps turning to the home songs of the other land." The young man about to found his earthly home wanted the right sort of song. But the old man was thinking of what we call the Heavenly home, and he asked me: "Do you know: 'I've reached the land of corn and wine'?" He sang it, and I joined. He sang another song, and that song I love for it is simple and so much a song of my childhood. And last winter when at State College I asked the college boys if they knew it, few did. But we who did joined in singing it, and to them all I said my thought of why so simple an old hymn should be sung the world over. We here can sing it better, understanding it better. Let us all sing it. It is: "In the Sweet Bye and Bye."

There is yet another hymn which all the world knows and sings. Why? Because it is the prayer of the universaly heart,—simple but great. Written as the prayer of one soul trying to voice its need of Almighty aid it has become the hymn-prayer of all the world. Let us join in singing it: "Nearer my God to Thee."

Few there be of that great family of persons whose childhood lies well in the past who do not consciously realize from such an inheritance. A very few songs may constitute their riches and these of little intrinsic merit, a mother's bedtime croon, a father's simple old hymn, a family chorus or glee, some favorite from old days that association has kept. Yet no price could buy this heritage of song.

The sons and daughters of other lands, seeking better opportunities for living for themselves and for their children, cross to the American shore. In Pennsylvania are to be found thousands of men, women, and children whose native land lies far away from this new home of their adoption. Many families that thus bravely began home-building in a strange country brought with them very little of this world's goods, yet not one came without a heritage of song as a gift to the community into whose life the members of that family went to become citizens. In many instances we have heard the fathers and mothers in their farm homes,

"Sing to their sons those melodies,
Those songs their fathers sung."

How welcome such songs are with their age-long standards of loyalty and purity and truth! Songs that have lived years and centuries in the Old World because they sang of country, and home, and mother, and God, should go on living in the New World, singing of country, and home, and mother, and God. Richard of Saltoun said, "Let me write the songs of a nation and I care not who makes its laws." Sing the songs of the country whose blood you bring to America and you will help make the laws that must best govern song-making and song-singing in this "land of the free and home of the brave." If we are to become a music-loving nation, we must have American music; it must smack of our soil; it must embody the character and express the tendency and trend of American life; it must bear the marks of our weal and woe; it must show in strongly marked rhythms the effect of our developed and developing national energy; it must be the faithful interpreter of the true American.

Has the song lived? Will the song live? In addition to all technicalities of a song there is another, which we may call the test of personal possession. Does or will the song live for me, the individual? Has it a place in my life for reasons personal and of value to me? Has it had the power with me to suggest thought, action, habit, character? As memory, does it leave me unashamed and glad to recall it? Is it a song by which I shall be happy to have my children remember their home?

Are our home, school, community songs the bearers of good and imperishable associations? They may be recent, but more than likely they are "good songs to us because they are the songs of our early homes. They have stood the test of personal possession. These songs are the children's heritage songs, which through a long life they will respond to because child and song grew and lived together.

The CHAIRMAN: Do any one of you wish to speak a few words before we close the meeting?

DIRECTOR MARTIN: Just a moment; there is a photographer here waiting at the outer door, who desires to take a picture of this Convention, and we would like to have you all, when you adjourn, repair to the porch in order that he may take that picture.

The CHAIRMAN: Do I hear from anyone who wishes to speak? While casting my eyes on the program, I noticed the subject, "Songs that Live;" and that brought to my mind, this pleasant meeting that we are having here, enjoying ourselves in peace and safety, in happiness and security, while two-thirds of the world's people are at war with each other. One thought struck me and it was this: that it would be appropriate for us before we adjourn to sing at least one or two verses from that hymn that we hope will never die, our national hymn, and I will call on Brother Posten to lead us in the first and last verses of that hymn, "America."

(After singing "America," the meeting adjourned).